Soft Tissue Augmentation

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Lecture Outline

- Anatomy of the Gingiva
- Management of Soft Tissue
  - Interdental papilla
  - Keratinized mucosa
  - Gingival Biotype
- Factors affecting on esthetic outcome

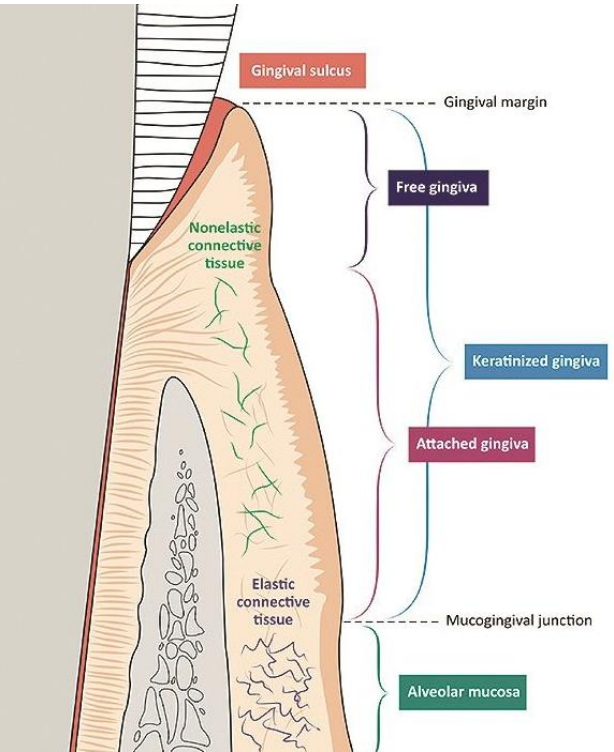
Anatomy of the Gingiva

- Attached Gingiva
- Free Gingiva
- Mucogingival Junction
- Alveolar Mucosa

Anatomy of the Gingiva

Attached Gingiva

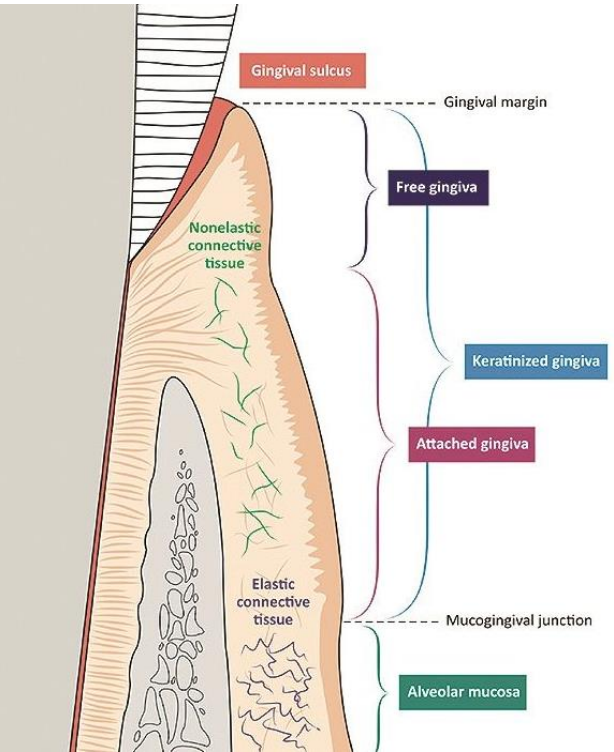
The portion of the gingiva that is firm, dense, stippled and tightly bound to the underlying periosteum, tooth, and bone.



Anatomy of the Gingiva

Free Gingiva

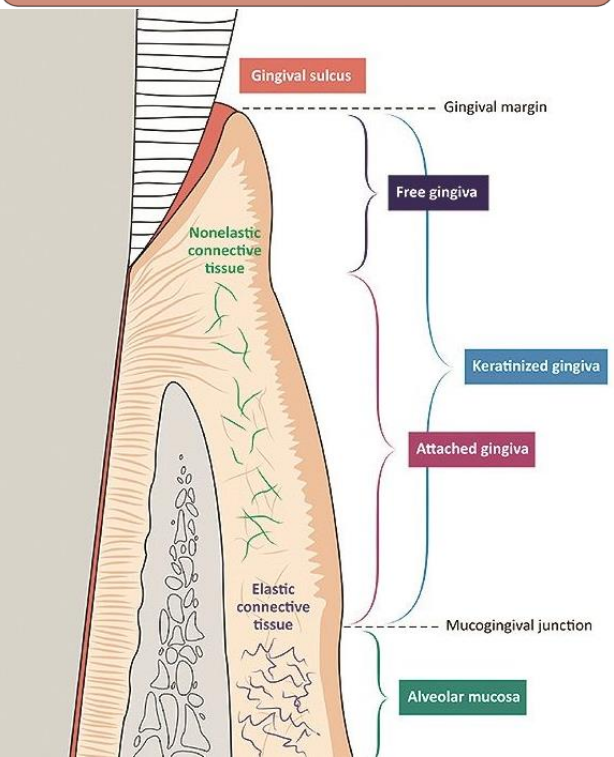
That part of the gingiva that surrounds the tooth and is not directly attached to the tooth.



Anatomy of the Gingiva

Mucogingival Junction

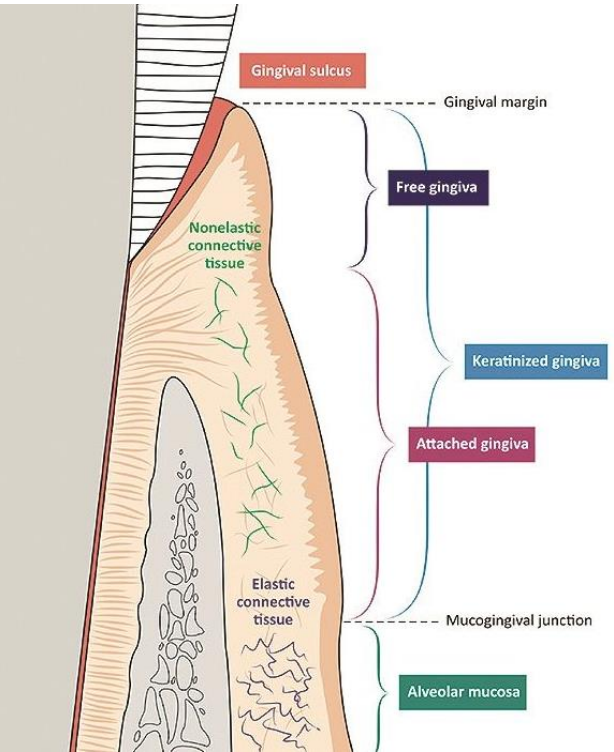
The area of union of the gingiva and alveolar mucosa



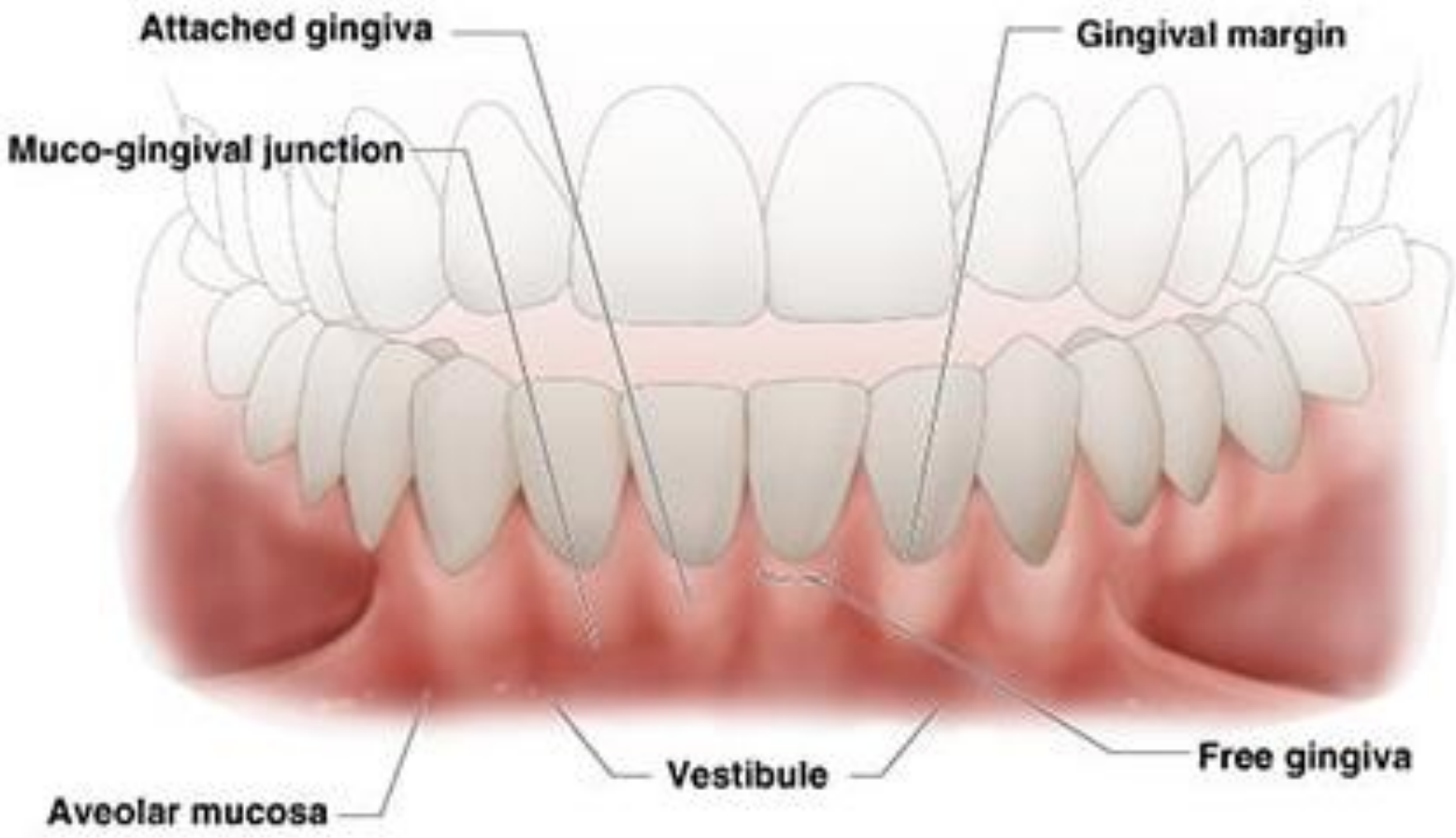
Anatomy of the Gingiva

Alveolar Mucosa

Loosely attached mucosa covering the basal part of the alveolar process and continuing into the vestibular fornix and the floor of the mouth.



Anatomy of the Gingiva



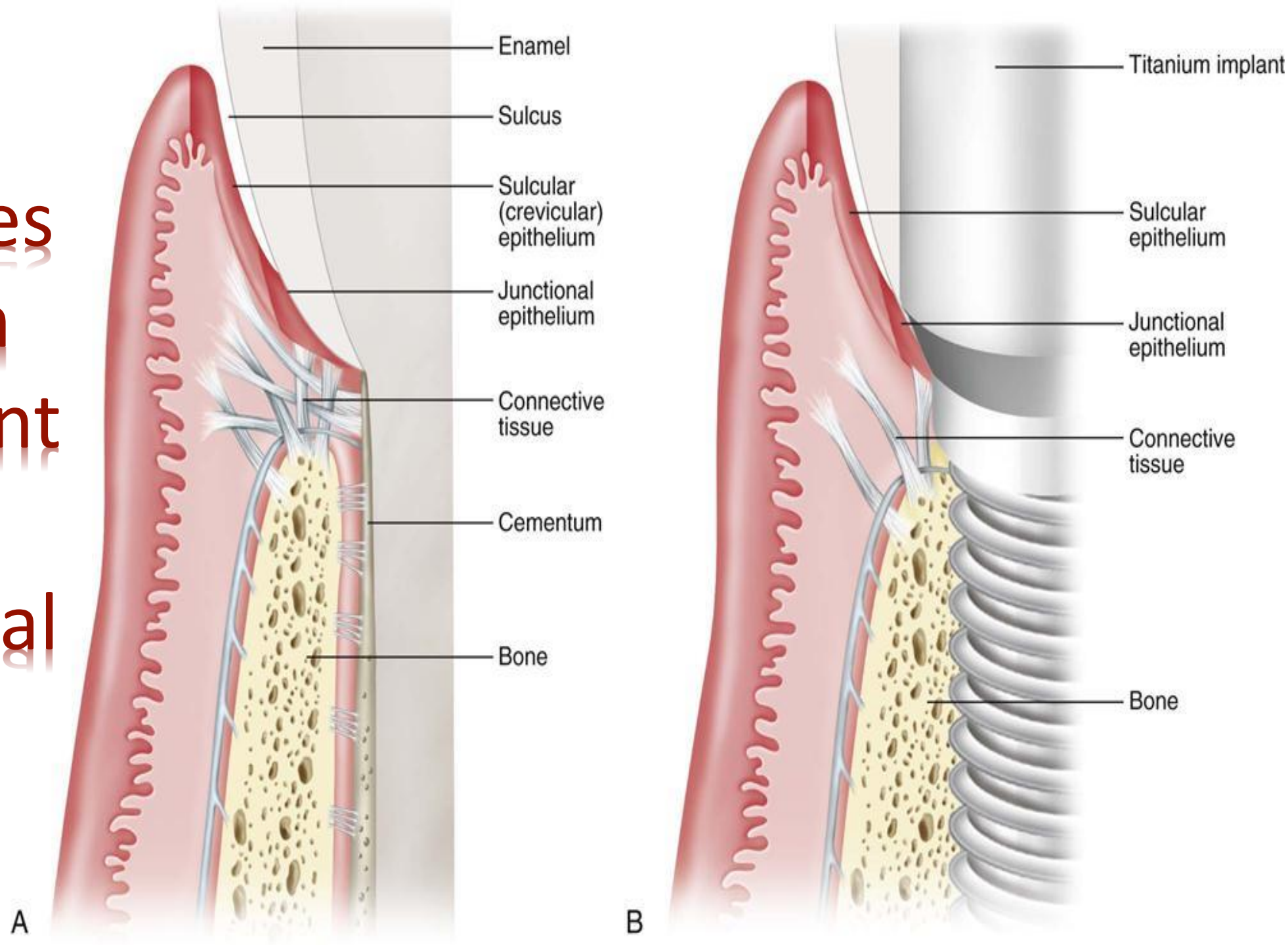
Masticatory

- Hard palate and gingiva (around the teeth)
- Keratinized

Lining

- Alveolar mucosa
- Non-keratinized

Differences between Per-implant and Periodontal tissues



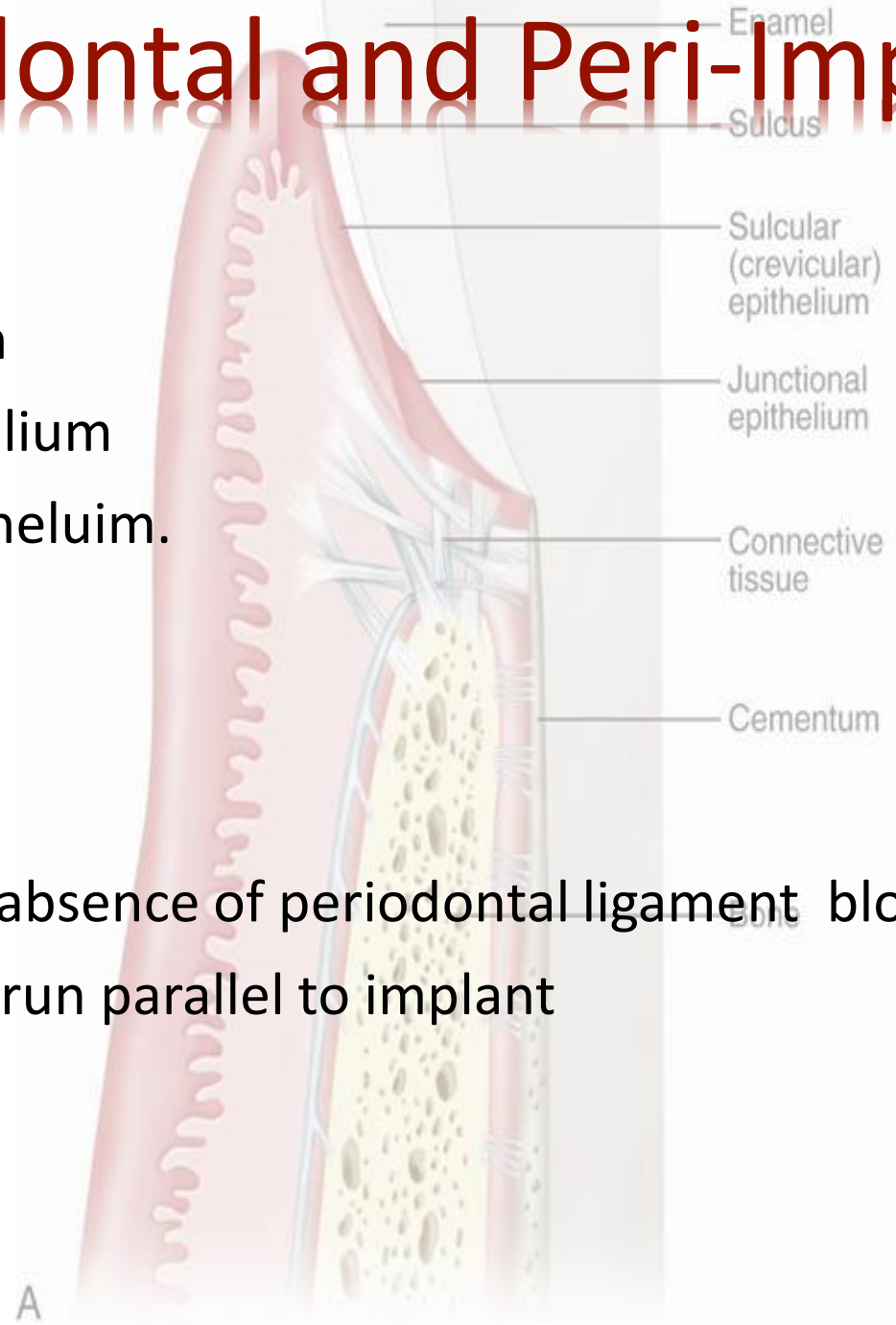
Periodontal and Peri-Implant Soft Tissue

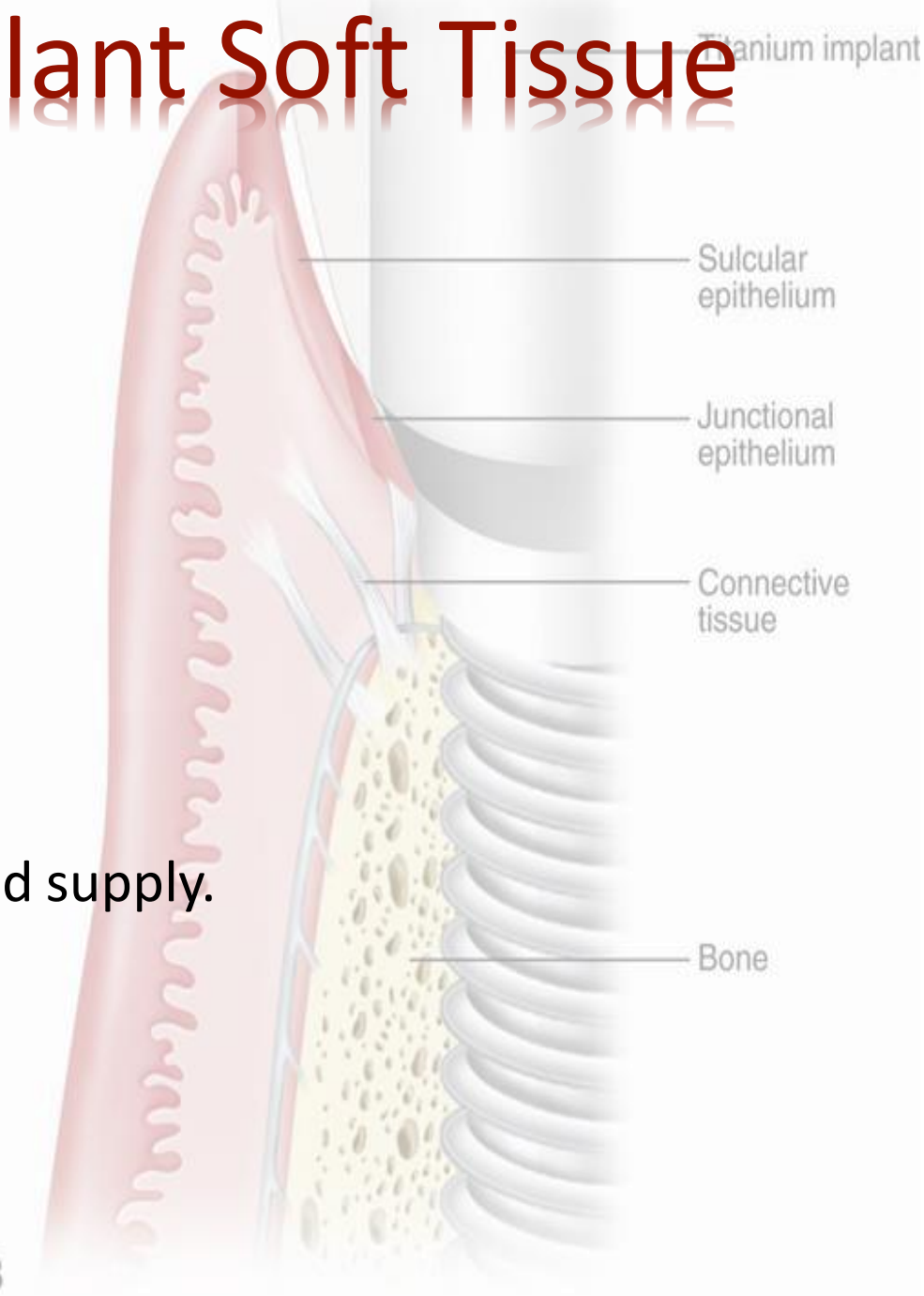
Similarities

1. Oral epithelium
2. Sulcular epithelium
3. Junctional epitheluim.

Differences:

1. Hypocellular
2. Hypo vascular absence of periodontal ligament blood supply.
3. Collagen fibers run parallel to implant





Comparison of Vascular Topography

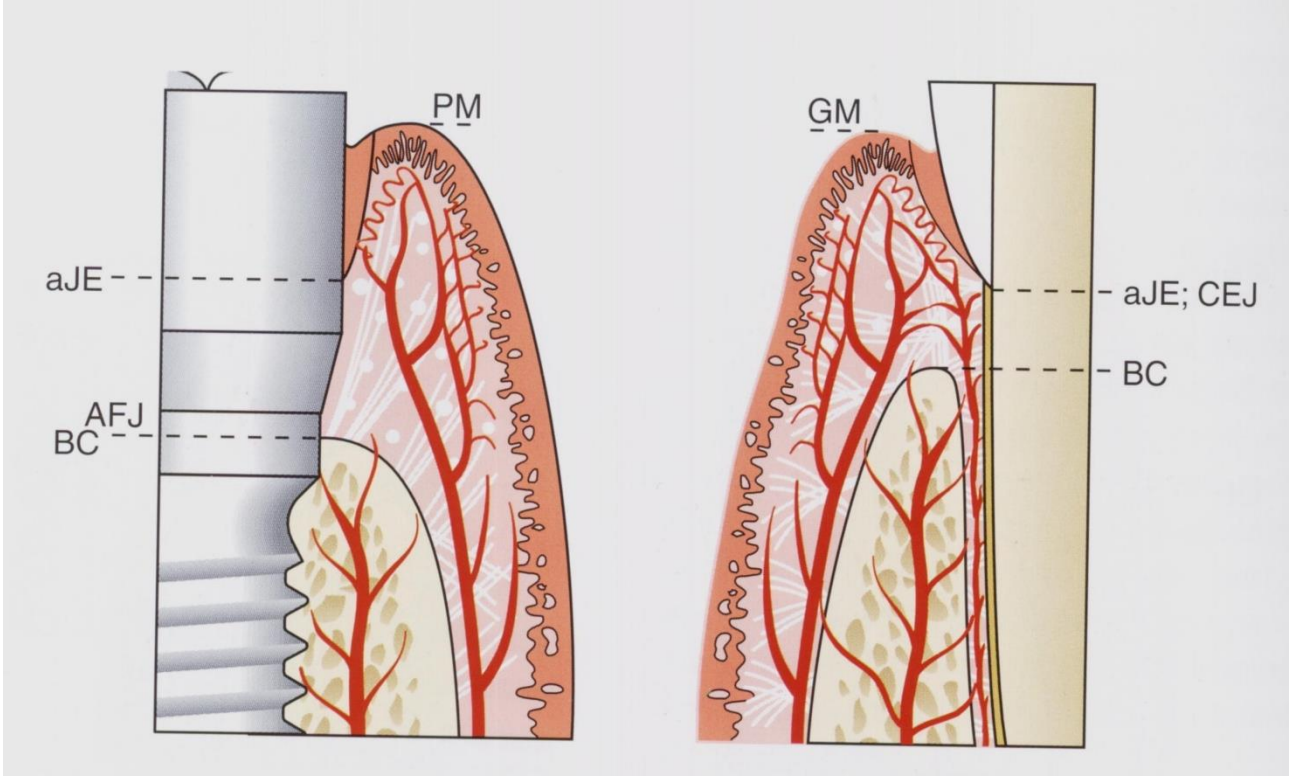
Peri-implant

Terminal branches of larger vessels from periosteum

Periodontium

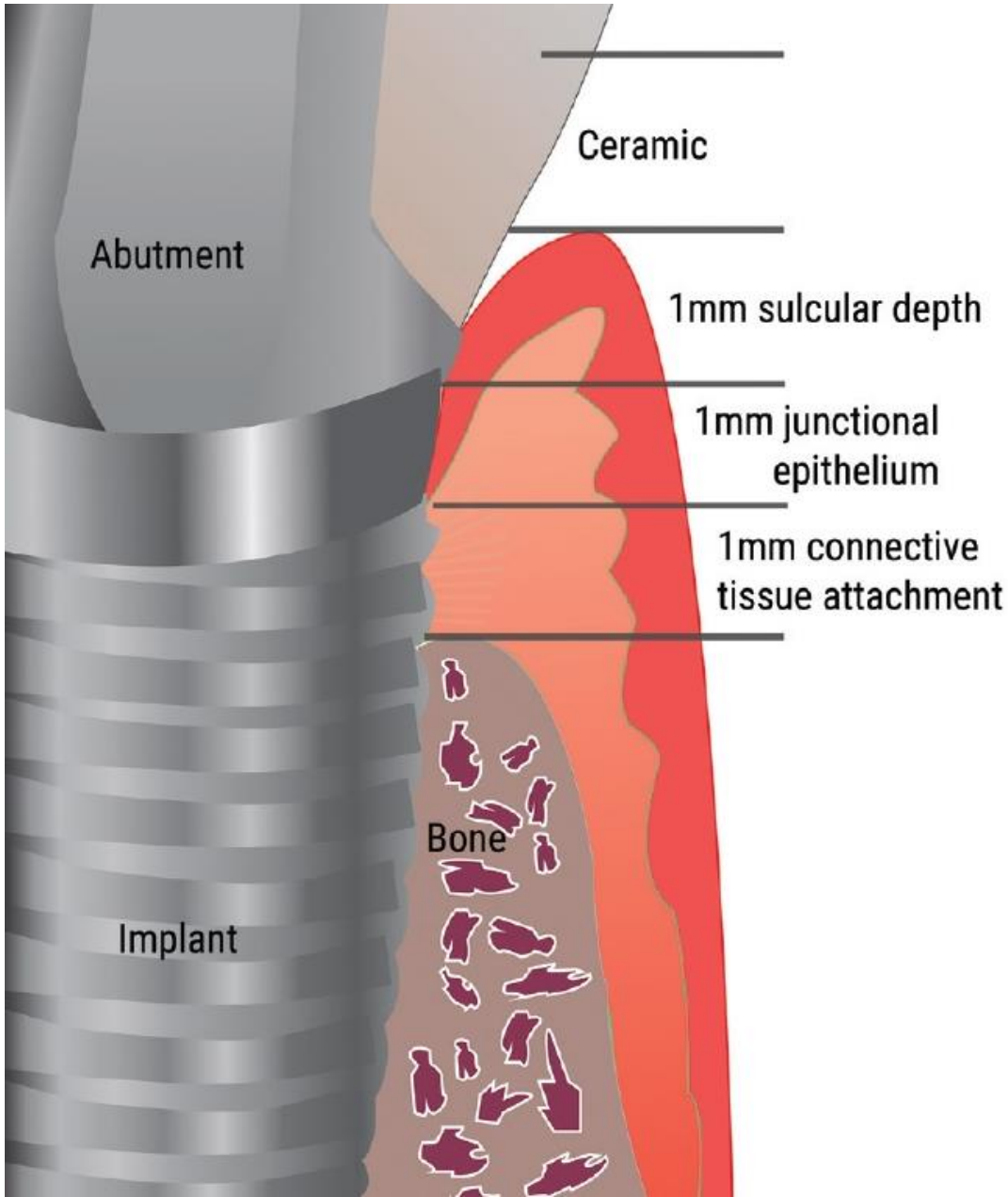
Supracrestal vessels

Vessels from PDL



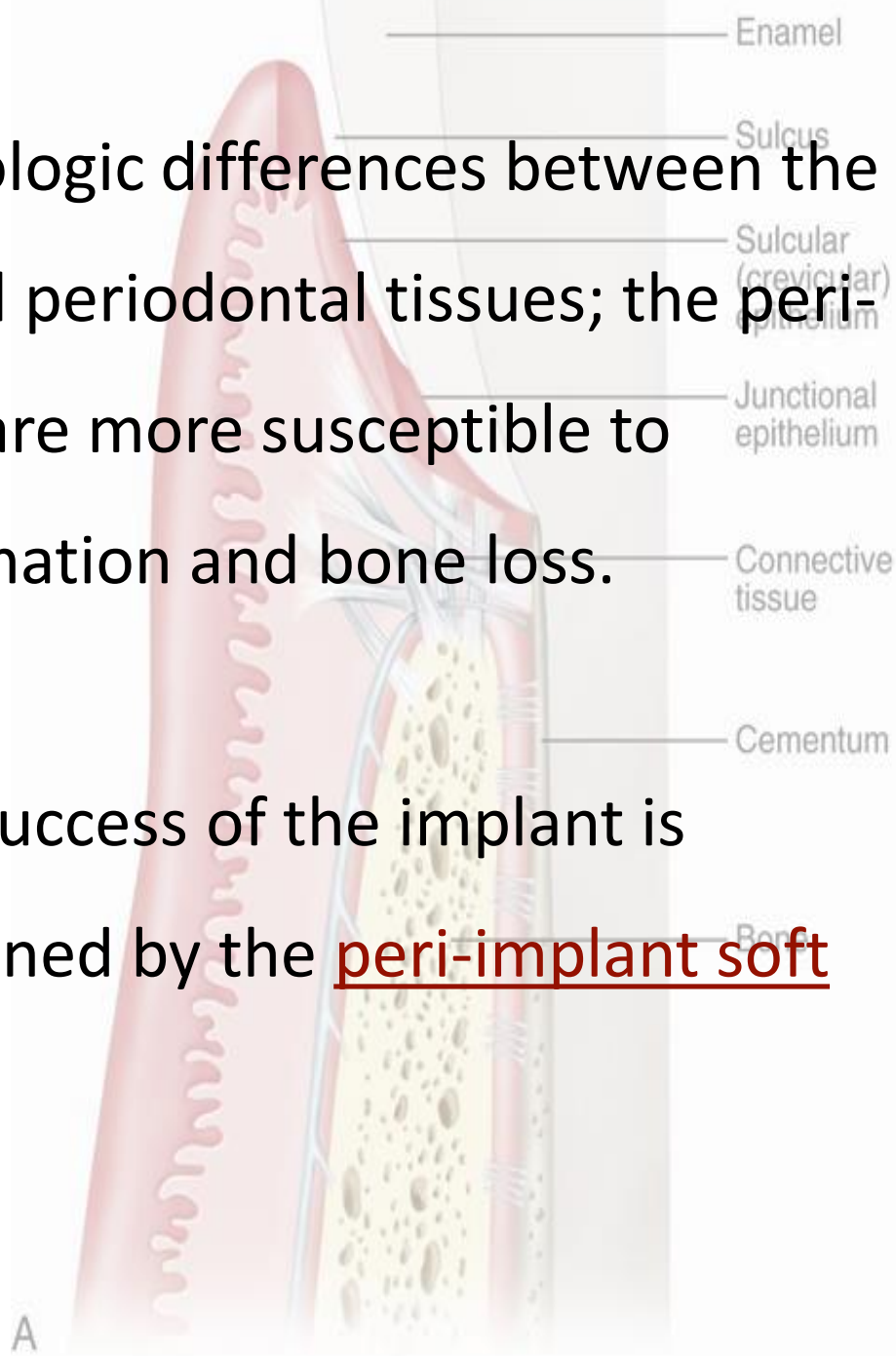
Biologic width – tooth versus implant

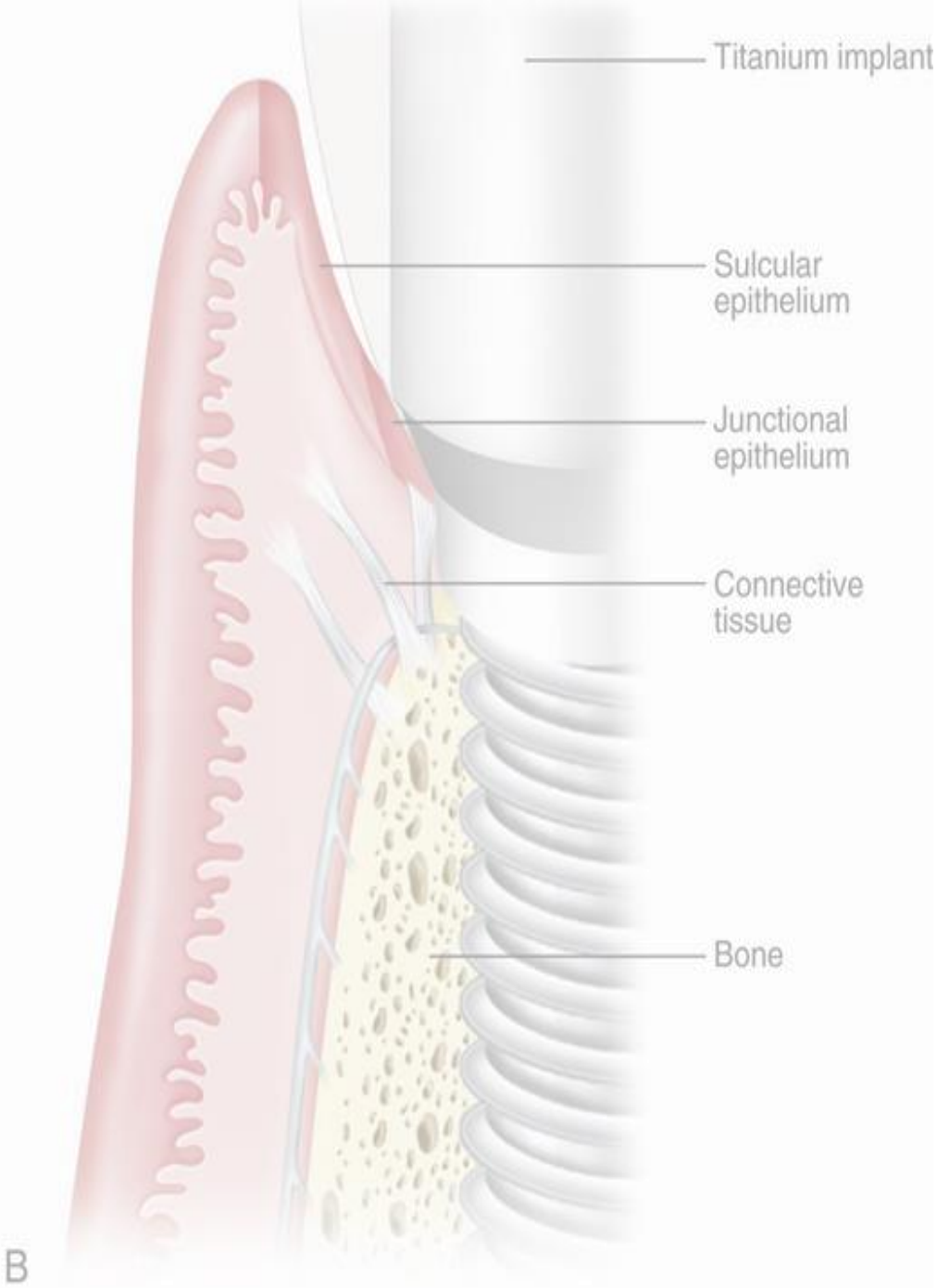
The length from the marginal portion of the peri-implant mucosa to the first bone-to-implant contact has been found to be approximately 3 mm .



Owing to the biologic differences between the peri-implant and periodontal tissues; the peri-implant tissues are more susceptible to mucosal inflammation and bone loss.

The long-term success of the implant is strongly determined by the peri-implant soft tissue integrity





Importance of Soft Tissue around Dental Implant

- Provides tight collar around tooth
- Prevent spread of infection
- Prevent recession of marginal tissue
- Enable patients to maintain good oral hygiene
- Provides good esthetics

Different Types of implant Failure

- Lack of osseointegration
- Unacceptable aesthetics
- Functional problems
- Psychological factors

Implant Success

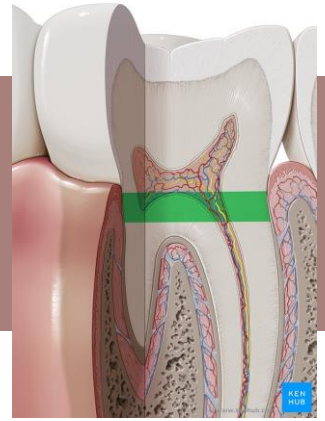
- Absence of mobility
- Marginal bone loss <1.5 mm during the first year
- Less than 0.1 mm annually thereafter,
- Absence of pain/parasthesia

Implant Survival

- Implant retained in its place

Let’s ask ourselves some questions

Management of Soft Tissue around Dental Implant

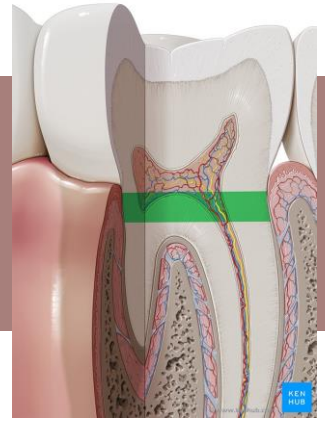


Interdental Papilla

Tissue Keratinization

Biotype - Thickness

Management of Soft Tissue around Dental Implant

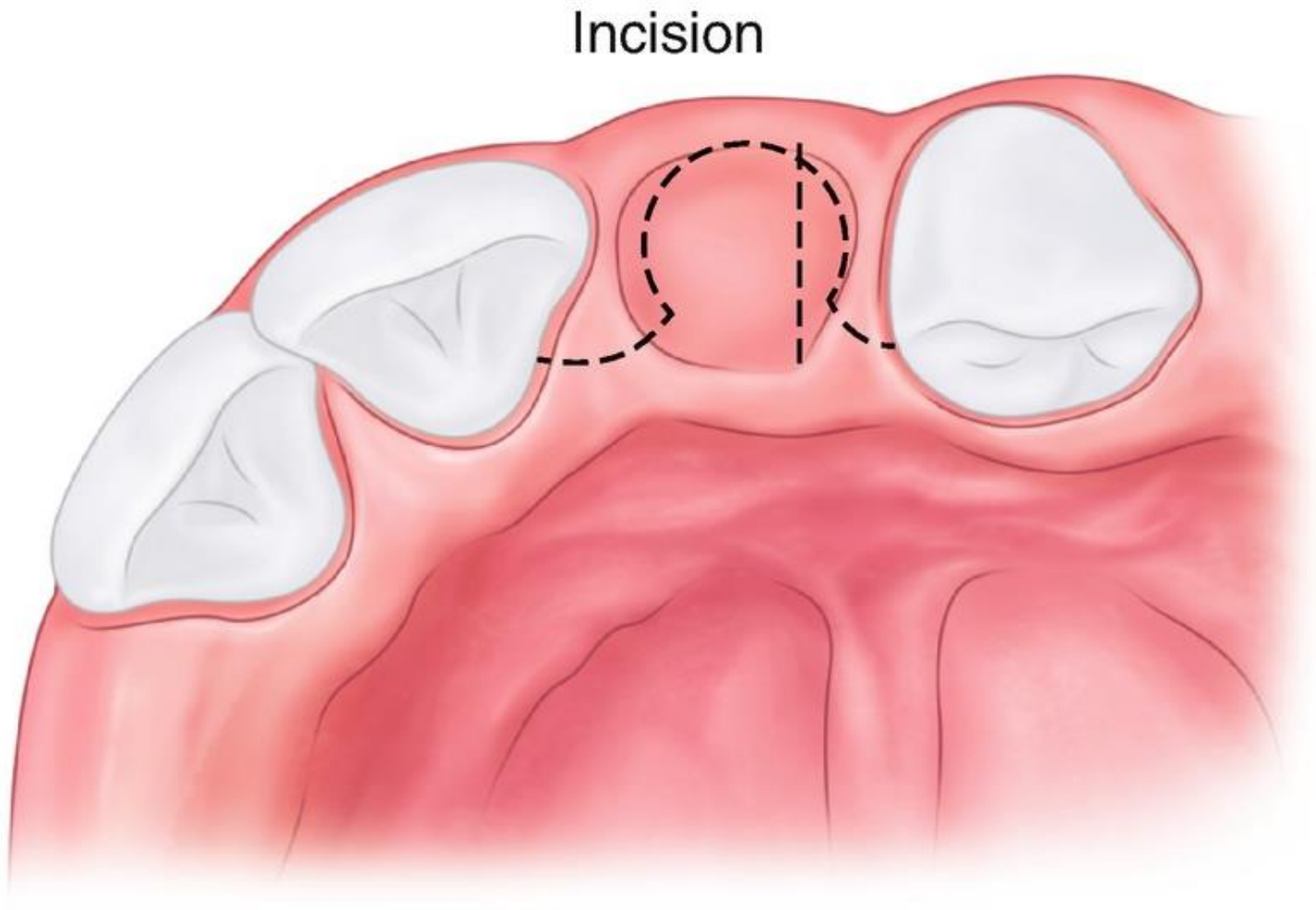


- **Interdental Papilla**
  - How to Maintain
  - How to Create
- **Tissue Keratinization**
  - How to evaluate
  - How to Maintain
  - How to Create
- **Biotype - Thickness**
  - How to Evaluate
  - How to Enhance

Interdental Papilla

How to Maintain

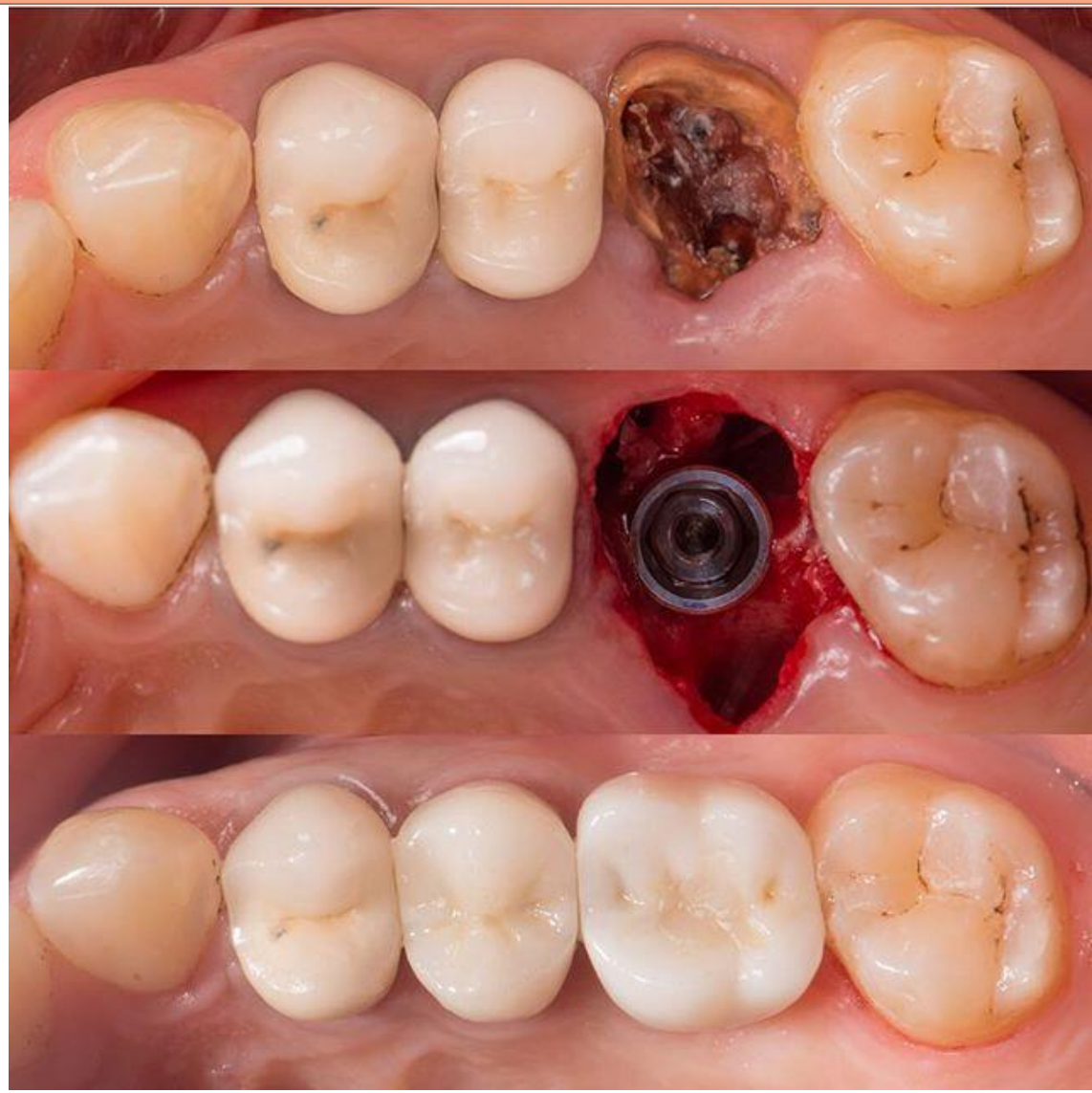
1. Flap design



Interdental Papilla

How to Maintain

1. Flap design
2. Immediate temporization



Interdental Papilla

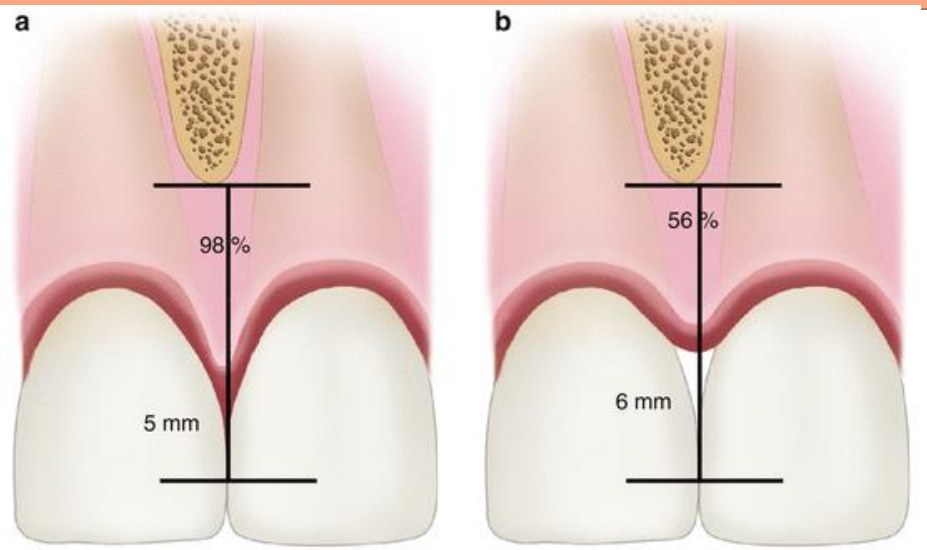
How to Maintain

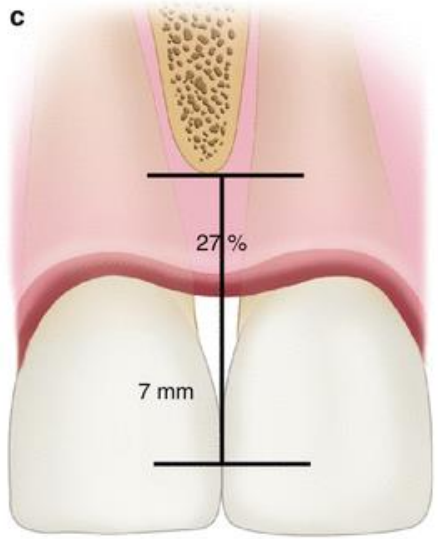
1. Flap design
2. Immediate temporization
3. Socket shield technique

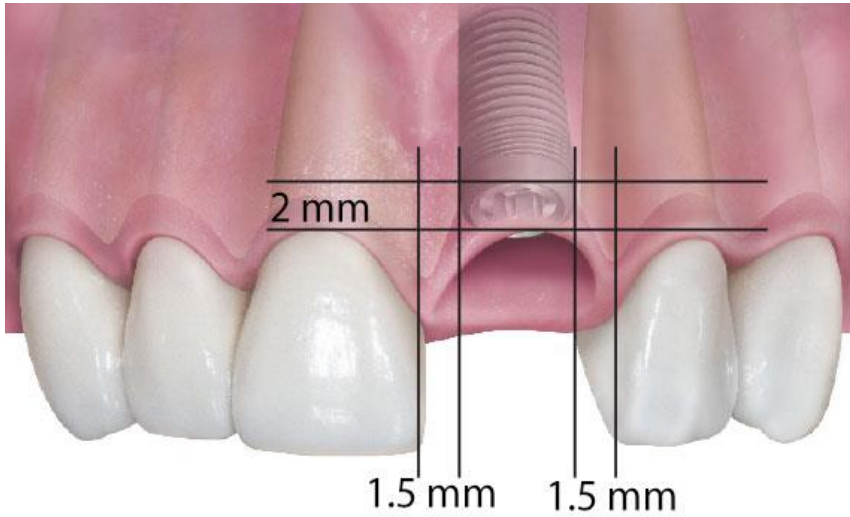
Interdental Papilla

How to Create

1. Implant tooth distance 1.5 mm
2. Implant implant distance 3 mm
3. Inter dental bone to CA 5 mm
4. Creation of papilla during second stage surgery







Interdental Papilla

How to Create

Papilla Height

Implant adjacent to tooth

- Depend on the vertical position of the periodontal attachment of the tooth.

Implant adjacent to Implant

- Papilla are Significantly Shorter
- Average Height 3.4 mm
- <1.5 mm than teeth

The Effect of the Distance From the Contact Point to the Crest of Bone on the Presence or Absence of the Interproximal Dental Papilla

Dennis P. Tarnow, Anne W. Magner,† and Paul Fletcher‡*

THIS STUDY WAS DESIGNED to determine whether the distance from the base of the contact area to the crest of bone could be correlated with the presence or absence of the interproximal papilla in humans. A total of 288 sites in 30 patients were examined. If a space was visible apical to the contact point, then the papilla was deemed missing; if tissue filled the embrasure space, the papilla was considered to be present. The results showed that when the measurement from the contact point to the crest of bone was 5 mm or less, the papilla was present almost 100% of the time. When the distance was 6 mm, the papilla was present 56% of the time, and when the distance was 7 mm or more, the papilla was present 27% of the time or less. *J Periodontol 1992; 63:995–996.*

Key Words: Papilla, interproximal; gingiva/anatomy and histology.

The presence or absence of the interproximal papilla is of great concern to periodontists, restorative dentists, and to patients. The loss of the papilla can lead to cosmetic deformities, phonetic problems, and lateral food impaction.

If the papilla reforms after surgical treatment, there will be increased pocket depth which could create difficulties with oral hygiene. Additionally, if the papilla reforms the interproximal col, which is non-keratinized and more permeable to bacterial by-products, will also be present.

Since Cohen first described the col in 1959 as buccal and lingual peaks of keratinized tissue with a non-keratinized or parakeratinized interproximal area,[1] very little has been done to determine when the interproximal papilla with its col is present.

In 1961 Kohl and Zander stripped the interproximal tissue on monkeys to determine if the papilla and col would reform.[2] They found that the papilla reformed by the end of the eighth postsurgical week. In 1963 Matherson and Zander[3] also studied the interproximal papilla and the shape of the col. Their study showed that the col took the shape of the contact area of the adjacent teeth and not the underlying bone. In addition, Stahl[4] showed that use of interproximal stimulation can modify the degree of keratinization of the col area.

All of these studies were designed to determine the shape of the col if it were present, or the degree of keratinization of the col. However, none determined when the papilla would, or would not, be present. The purpose of this study was to determine whether the distance between the contact point and the crest of bone correlated with the presence or absence of the interproximal papilla in humans.

MATERIALS AND METHODS

A total of 288 interproximal sites, 99 anterior interproximal, 99 pre-molar interproximal, and 90 molar sites, in 30 patients were randomly selected for examination. All contact points were closed, and a standardized periodontal probe with Williams markings was used for measurements.

To reduce any edema and inflammation that might be present, all patients underwent thorough scaling and root planing 2 to 8 weeks before the measurements were recorded.

The presence or absence of the interproximal papilla was determined visually prior to probing. If there was no space visible apical to the contact point, the papilla was deemed to be present.

At the time of surgery, the patient was anesthetized and the probe was inserted vertically on the facial aspect of the contact point until the crest of bone was sounded. All measurements were rounded off to the nearest millimeter.

Additionally, the depths of the pocket of the teeth adjacent to the test sites were probed, and were found to be 4 mm or greater in a majority of the sites.

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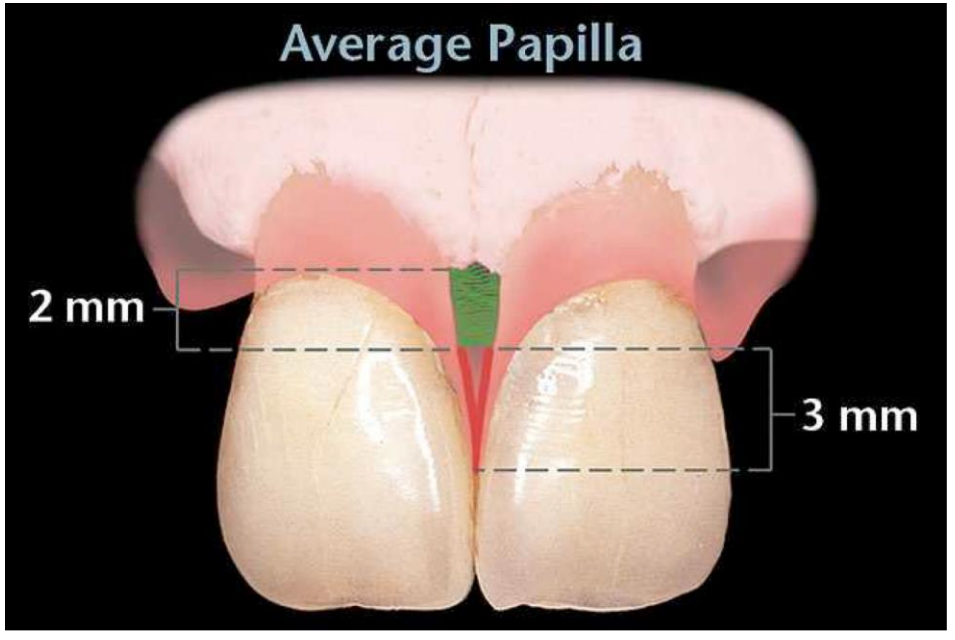
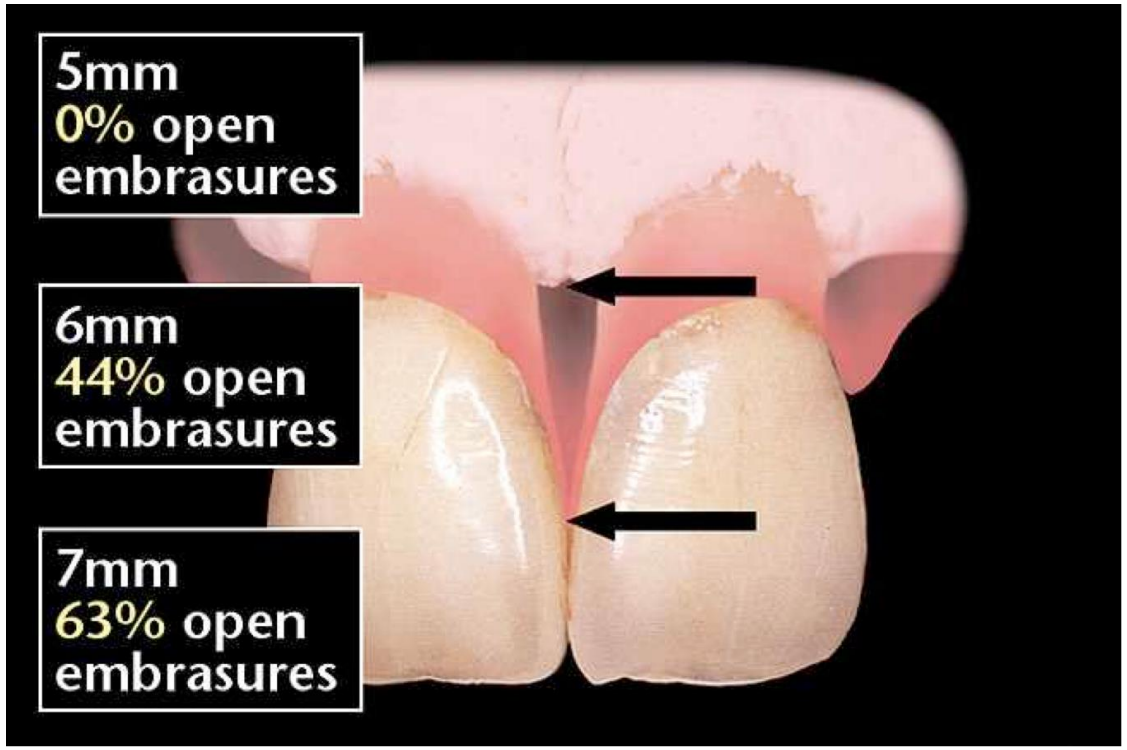
Single Implant



filled the embrasure space, the papilla was considered to be present. The results showed that when the measurement from the contact point to the crest of bone was 5 mm or less, the papilla was present almost 100% of the time. When the distance was 6 mm, the papilla was present 56% of the time, and when the distance was 7 mm or more, the papilla was present 27% of the time or less. *J Periodontol 1992; 63:995–996.*

- An increase of 1 mm in the distance increases the probability of a gingival black space from 78% to 97%.
- As a rule, the distance between 5 and 6 mm is the most critical and it determines the presence or lack of space in the gingival embrasure

- Tarnow’s findings on contact height above bone and open embrasures.



Multiple Implants

J Periodontol • December 2003

Vertical Distance from the Crest of Bone to the Height of the Interproximal Papilla Between Adjacent Implants

Dennis Tarnow,* Nicolas Elian,* Paul Fletcher,† Stuart Froum,* Ann Magner,† Sang-Choon Cho,* Maurice Salama,‡ Henry Salama,‡ and David A. Garber§

Background: As patient demand increases for more natural restorations in the esthetic zone, clinicians must have the highest level of skill and knowledge to maintain or reform the interdental papilla between teeth, between implants and teeth, and between adjacent implants. To date, there are no reports that have measured the distance from the contact point to the bony crest between implants. One reason for this may be the fact that, with two adjacent implants, the contact point of the crown can be established at any distance from the gingival margin according to the restorative dentist's specifications. Therefore, in this study, the height of the soft tissue to the crest of bone was measured between two adjacent implants independent of the location of the contact point. The purpose of this study was to determine the range and average height of tissue between two adjacent implants.

Methods: A total of 136 interimplant papillary heights were examined in 33 patients by eight different examiners in five private dental offices. After administration of appropriate local anesthesia, a standardized periodontal probe was placed vertically from the height of the papilla to the crest of bone. The measurements were rounded off to the nearest millimeter.

Results: The mean height of papillary tissue between two adjacent implants was 3.4 mm, with a range of 1 mm to 7 mm.

Conclusions: Clinicians should proceed with great caution when placing two implants adjacent to each other in the esthetic zone. In most cases, only 2, 3, or 4 mm of soft tissue height (average 3.4 mm) can be expected to form over the interimplant crest of bone. These results showed that modification of treatment plans may be necessary when esthetics are critical for success. *J Periodontol 2003;74:1785-1788.*

KEY WORDS

Dental esthetics; dental implantation; dental papilla/anatomy and histology; soft tissue/anatomy and histology.

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The presence or absence of the interdental papilla between teeth, between implants and teeth, and between adjacent implants has received much attention in the past decade. With increasing demands for more natural-looking restorations in the esthetic zone, clinicians must maintain a high level of skill and knowledge.

A clinical study related the presence or absence of the papilla between two teeth to the distance from the crest of bone to the contact point between the teeth.[1] When this distance was 5 mm or less, the papilla completely filled this space almost 100% of the time. When the distance was 6 mm, the interdental space filled about 55% of the time; and at 7 mm, the interdental space was completely filled about 25% of the time.

When an implant is placed adjacent to a tooth, a <5 mm distance between the contact point and the crest of bone shows similar results regarding presence or absence of papilla to that between two adjacent teeth. Grunder presented 10 case reports of single-tooth implants and stated that all the papillae reformed after the final crowns were placed on the implants.[2] The critical factors in all 10 cases were 1) the existence of healthy bone on the adjacent tooth and 2) the location of this bone at a distance of 5 mm or less from the contact point. Grunder's study agreed with

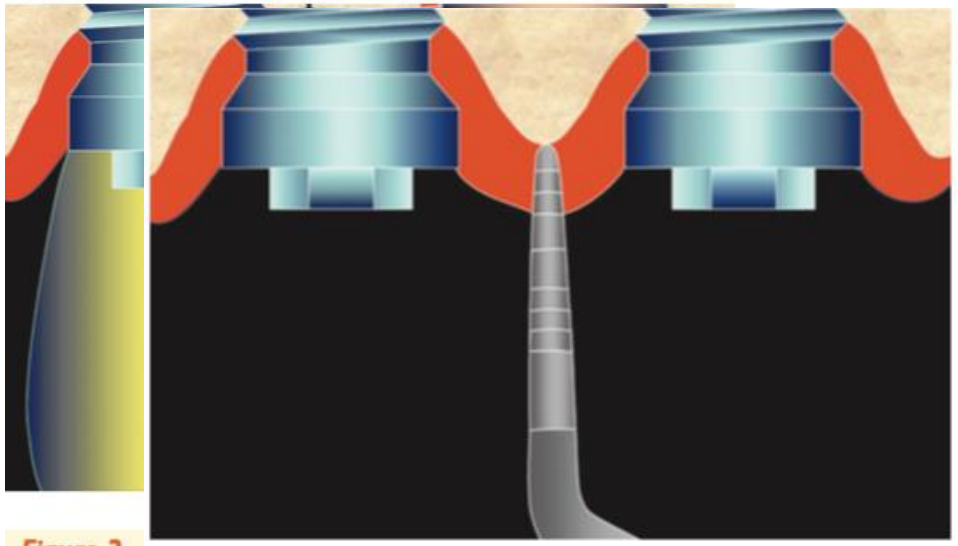


Figure 3.
Interdental tissue does not have the same level of support on an implant (a) as it does on a tooth (b).

Results: The mean height of papillary tissue between two adjacent implants was 3.4 mm, with a range of 1 mm to 7 mm.

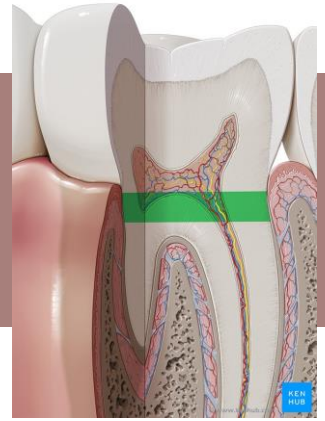
Conclusions: Clinicians should proceed with great caution when placing two implants adjacent to each other in the esthetic zone. In most cases, only 2, 3, or 4 mm of soft tissue height (average 3.4 mm) can be expected to form over the interimplant crest of bone. These results showed that modification of treatment plans may be necessary when esthetics are critical for success. *J Periodontol 2003;74:1785-1788.*

Tissue Keratinization

How to evaluate

- Visual
- Rolling
- Visual after staining

Gingival Keratinization



Lang and Loe

Stated that Implant should be surrounded by 2 mm of Keratinized mucosa (1mm attached gingiva) to maintain the health of the surrounding gingiva.

Not associated with more **bone loss**, or to be more prone to **peri-implant disease**.

Wider zone of KT may better **preserve** soft and hard tissue stability

lack of KT was not considered to be crucial in maintaining the health of peri-implant Soft tissues

Is the presence of Keratinized Mucosa Crucial?

Favors long-term maintenance and result in better **oral hygiene** and **less recession** over time.

Thoma et al, 2018 & Sculean et al, 2019

Gingival Keratinization

Limited zone of keratinized mucosa around dental implants May be associated with:

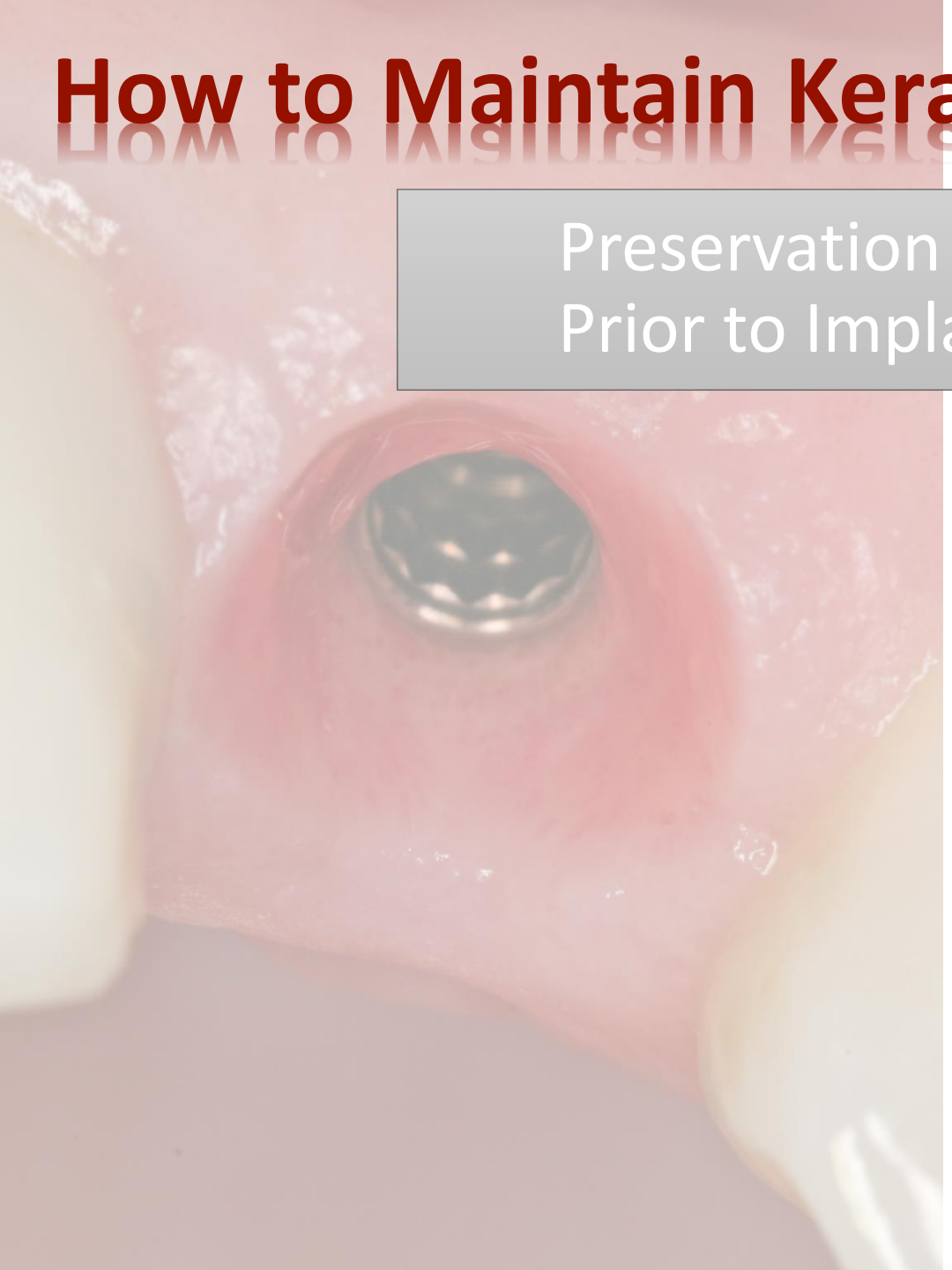
- Increased plaque accumulation.
- Mucosal inflammation.
- Bleeding on probing.
- Alveolar bone loss.
- Probing depth.

Tissue Keratinization

How to Maintain

- Preservation of Soft and Hard Tissues Prior to Implant Placement
- Modified incisions and Exposure techniques

How to Maintain Keratinized Mucosa



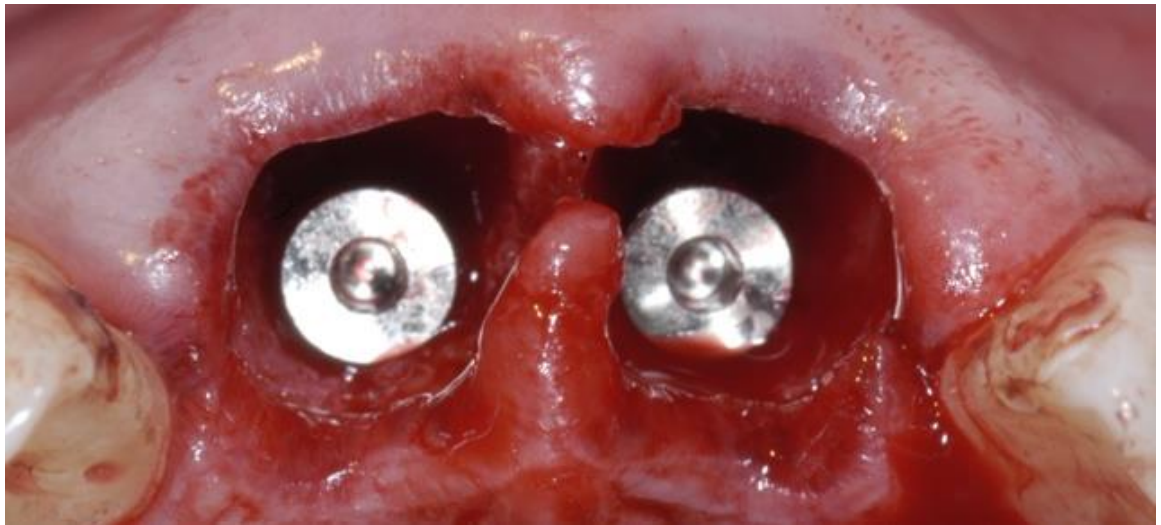
Preservation of Soft and Hard Tissues Prior to Implant Placement

1. Socket preservation
2. Immediate implants
3. Orthodontic extrusion before tooth extraction

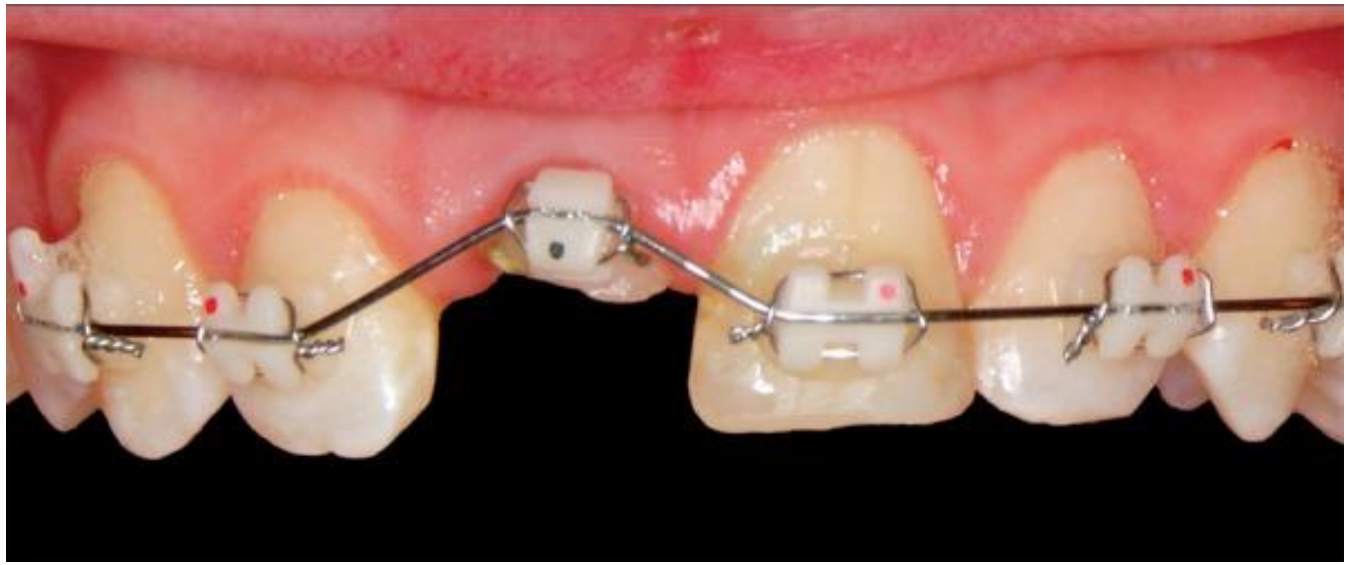
1- Socket preservation

2- Immediate implants

Preserve Bone Volume and accompanied Soft tissue

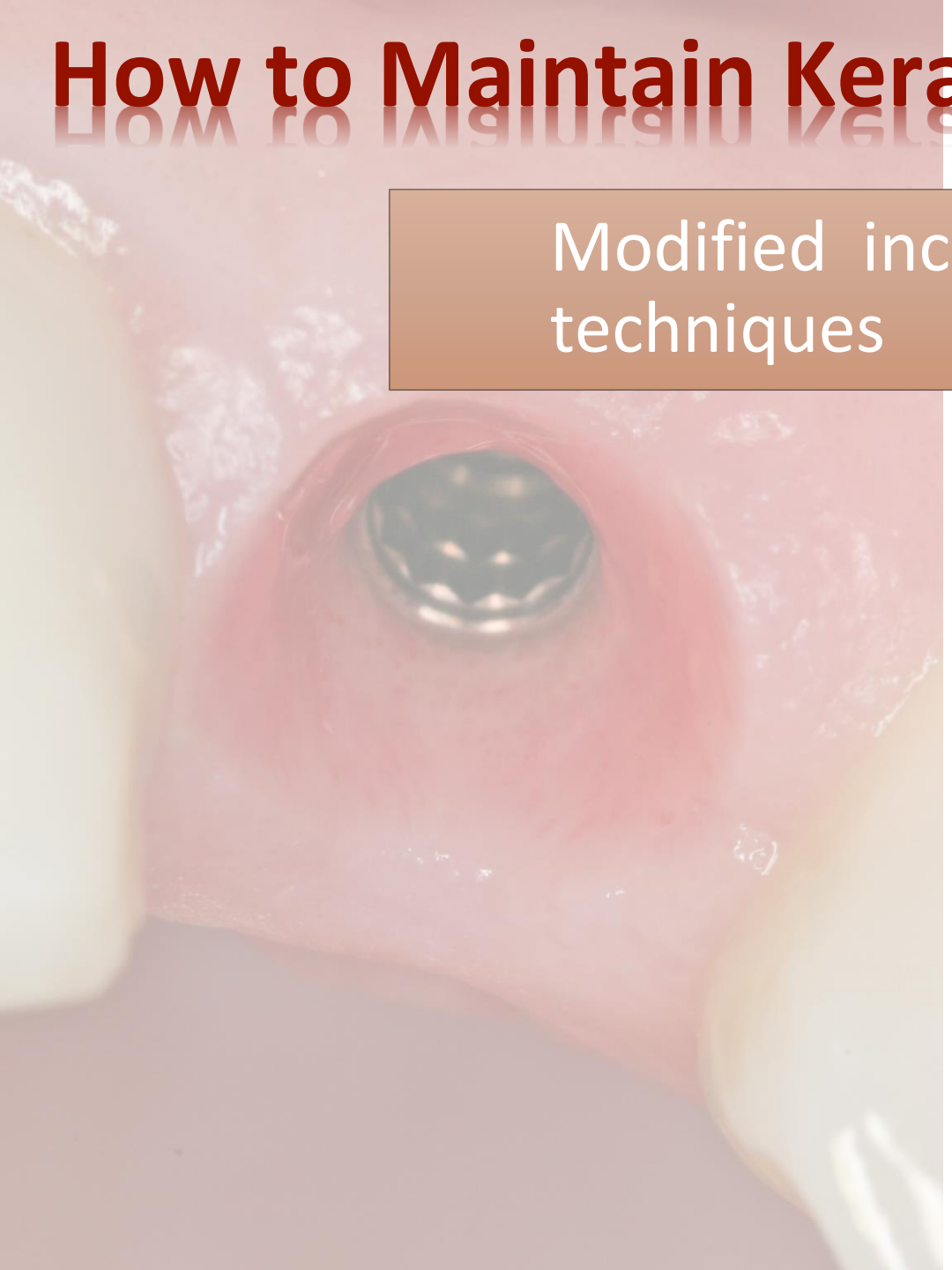


3-Orthodontic extrusion *(before tooth extraction)*



Orthodontic extrusion with light forces results in extrusion of the whole complex (tooth, gingiva & bone)

How to Maintain Keratinized Mucosa

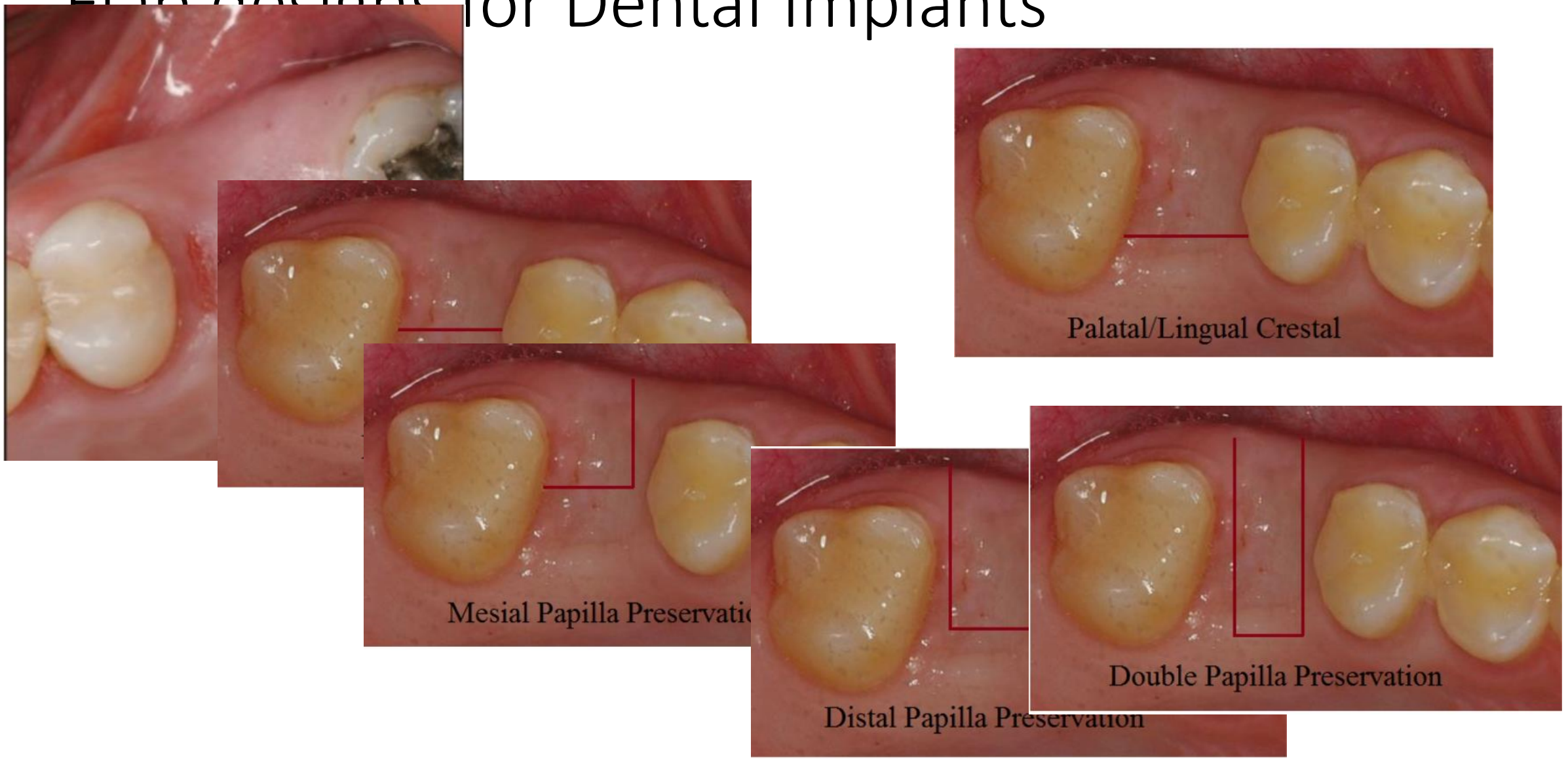


Modified incisions and Exposure techniques

1-Types of Incision

2-Exposure techniques

Flap designs for Dental Implants



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Incision design in implant dentistry based on vascularization of the mucosa

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doi: 10.1111/j.1600-0501.2005.01158.x

Key words: implant dentistry, incision design, supply area, vascularization

Abstract

Objectives: The delivery of an adequate amount of blood to the tissue capillaries for normal functioning of the organ is the primary purpose of the vascular system. Preserving the viability of the soft tissue segment depends on the soft tissue incision being properly designed in order to prevent impairment of the circulation. A knowledge of the course of the vessels as well as of their supply area are crucial to the decision of the incision. The aim of this study was to visualize the course of the arteries using different techniques, to perform macroscopic- and microscopic analyses, and to develop recommendations for incisions in implant dentistry.

Material and methods: The vascular systems of seven edentulous human cadavers were flushed out and filled with either red-colored rubber bond or Indian ink and formalin mixture. After fixation a macroscopic preparation was performed to reveal the course, distribution and supply area of the major vessels. In the area of the edentulous alveolar ridge specimens of the mucosa were taken and analyzed microscopically.

Results: The analyses revealed the major features of mucosal vascularization. The main course of the supplying arteries is from posterior to anterior, main vessels run parallel to the alveolar ridge in the vestibulum and the crestal area of the edentulous alveolar ridge is covered by a avascular zone with no anastomoses crossing the alveolar ridge.

Conclusion: The results suggest midline incisions on the alveolar ridge, marginal incisions in dentated areas, releasing incisions only at the anterior border of the entire incision line, and avoidance of incisions crossing the alveolar ridge.

Surgical disciplines are always confronted with the problem of cutting and therefore damaging healthy soft tissue in order to gain access to the area of interest in the human body. While the access requirements have not changed over time, the incision techniques have changed (e.g. laser [Mausberg et al. 1993; Bryant et al. 1998], electrosurgical knife [Mausberg et al. 1993; Sinha & Gallagher 2003], water scalpel [Siegert 2000] and piezosurgery [Shelley & Shelley 1986]. Irrespective of the applied technique, the surgical access

[1] optimal visualization of the key area;
[2] problem-free expansion of the soft tissue;
[3] mobilization of the overlying soft tissue to cover the surgical field;
[4] no placement over bony defects or cavities;
[5] sufficient vascularization of soft tissue;
[6] minimum tissue damage;
[7] assured wound healing;
[8] minimum esthetic impairment and
[9] good tissue covering.

Mucosal closure has to protect the bone.

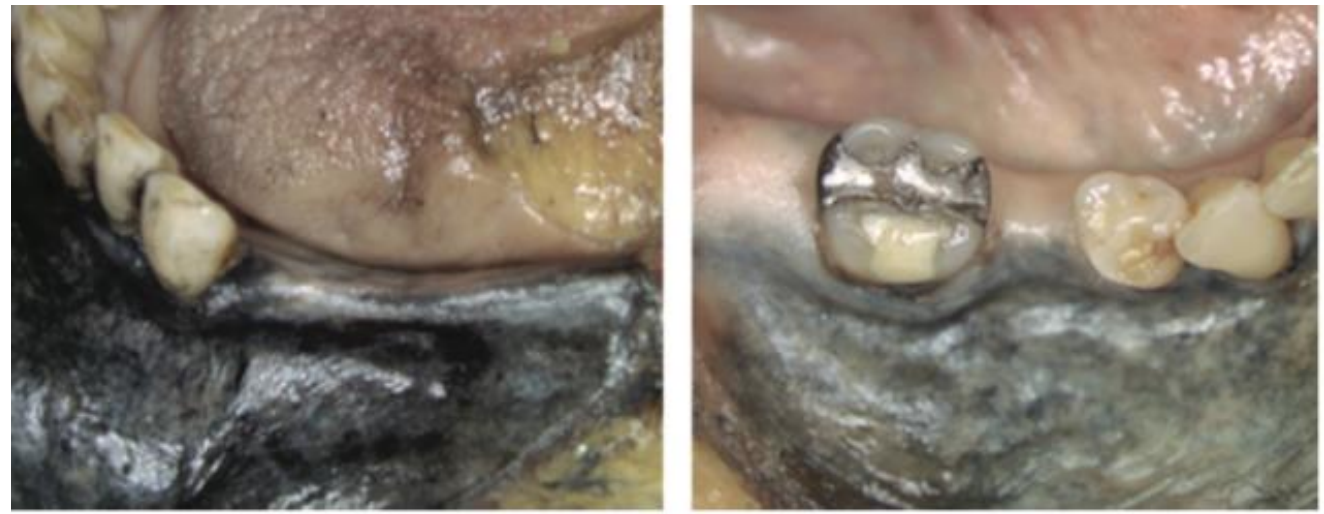


Fig. 6. After Indian ink injection a vascular separation line is visible in the center of the edentulous alveolar ridge.

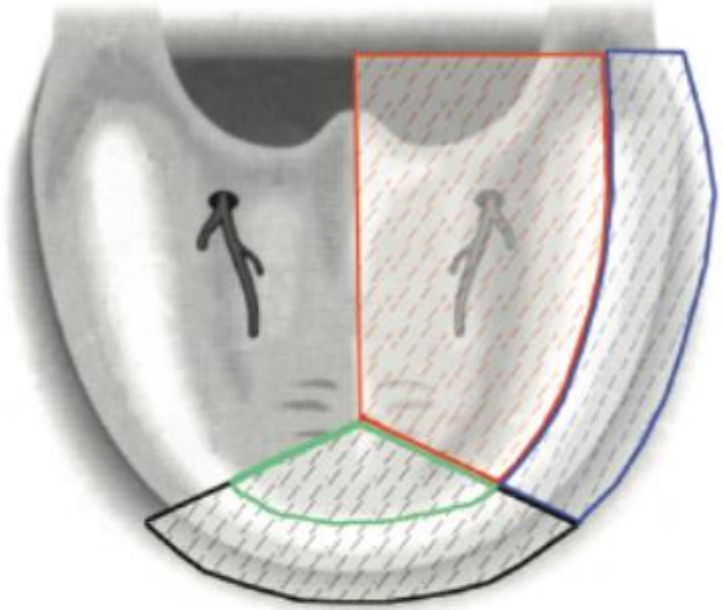


Fig. 4. Vascular territories of the maxilla. The colors show the supply areas of different arteries: blue – infraorbital artery, red – descending palatine artery, black – facial and infraorbital arteries, green – descending palatine and anterior superior alveolar arteries.

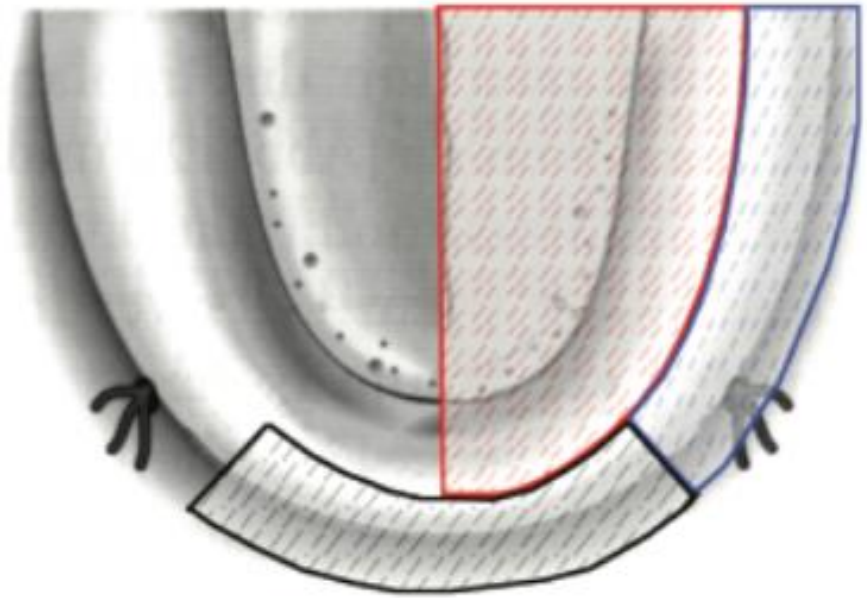


Fig. 5. Vascular territories of the mandible. The colours show the supply areas of different arteries: blue – facial artery, red – submental and sublingual arteries, black – inferior labial and mental arteries.

(1) The main course of the supplying arteries is from posterior to anterior.
(2) These vessels run parallel to the alveolar ridge in the vestibulum most of the time, only gingival branches stretch to the alveolar ridge.
(3) The crestal area of the edentulous alveolar ridge is covered by a 1–2 mm wide avascular zone with no anastomoses crossing the alveolar ridge.

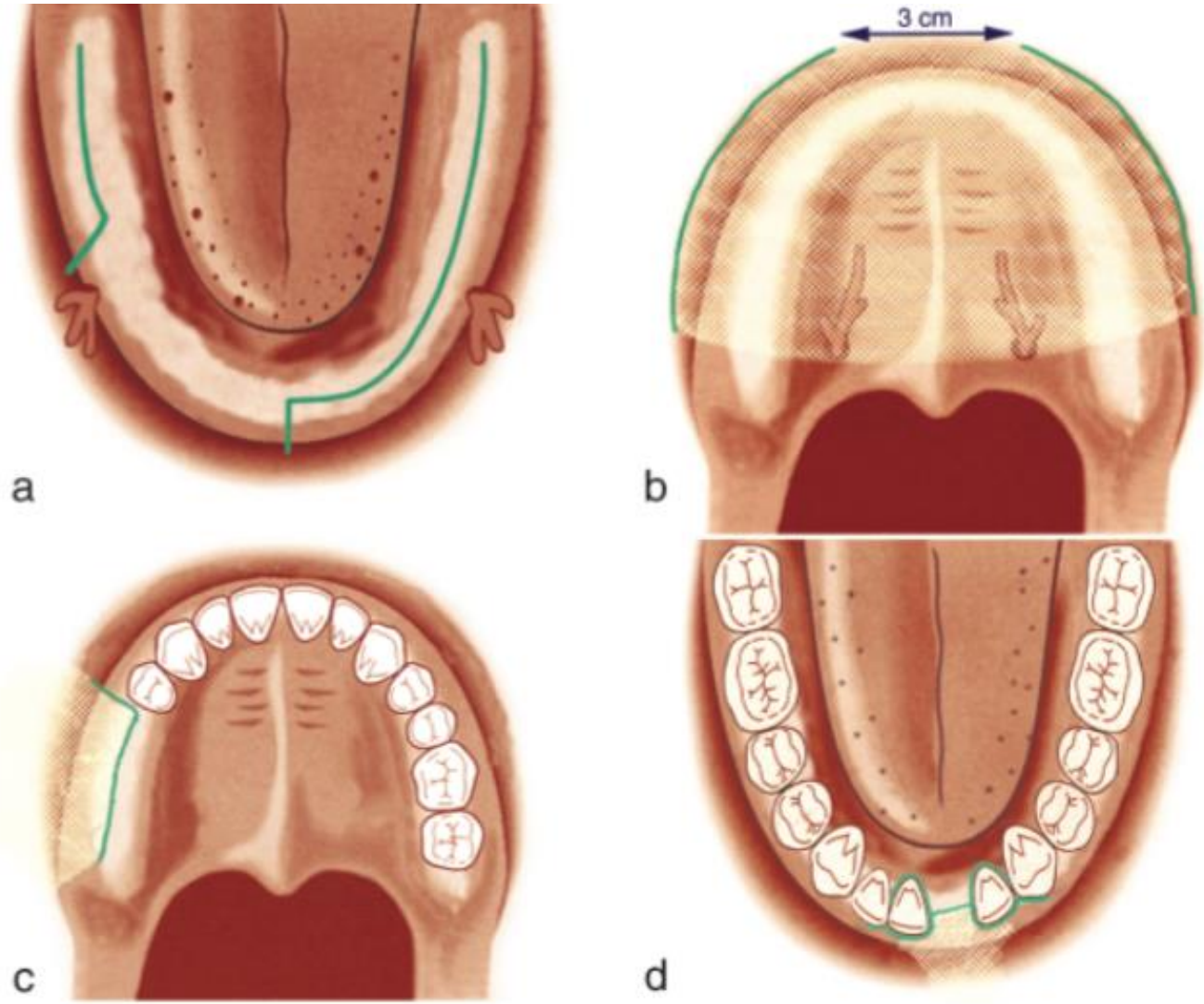
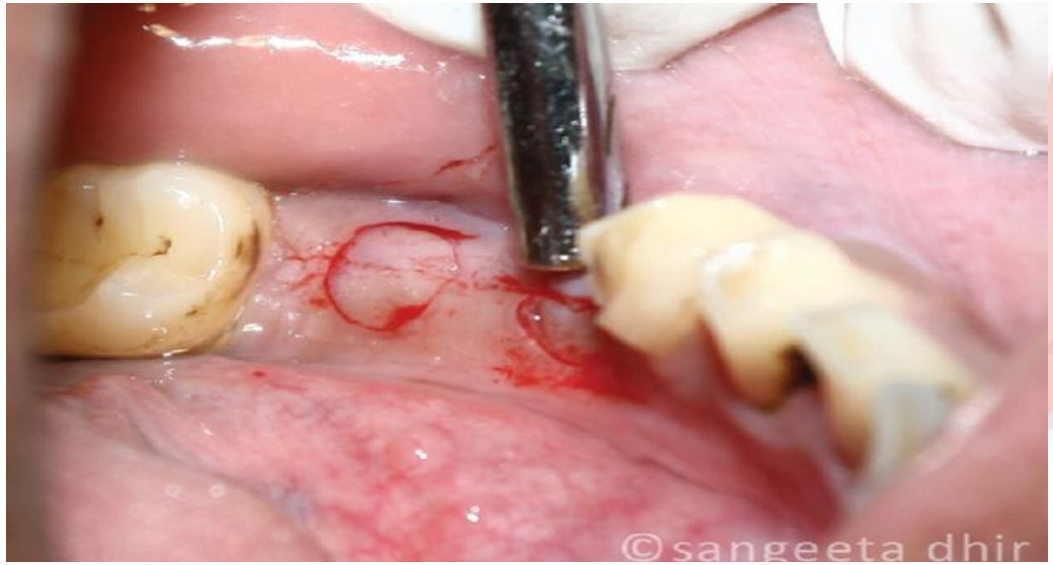


Fig. 8. Recommendations for the incision (a) edentulous areas, (b) edentulous areas: tunneling preparation, (c) free-end situation and (d) single tooth gap.

1-Types of Incision

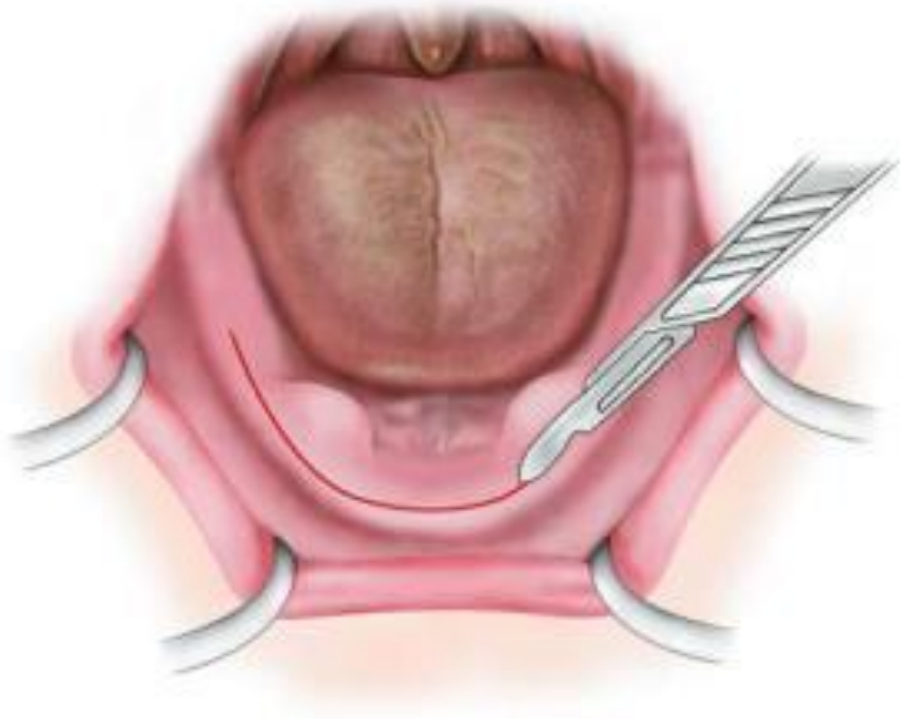
Punch approach

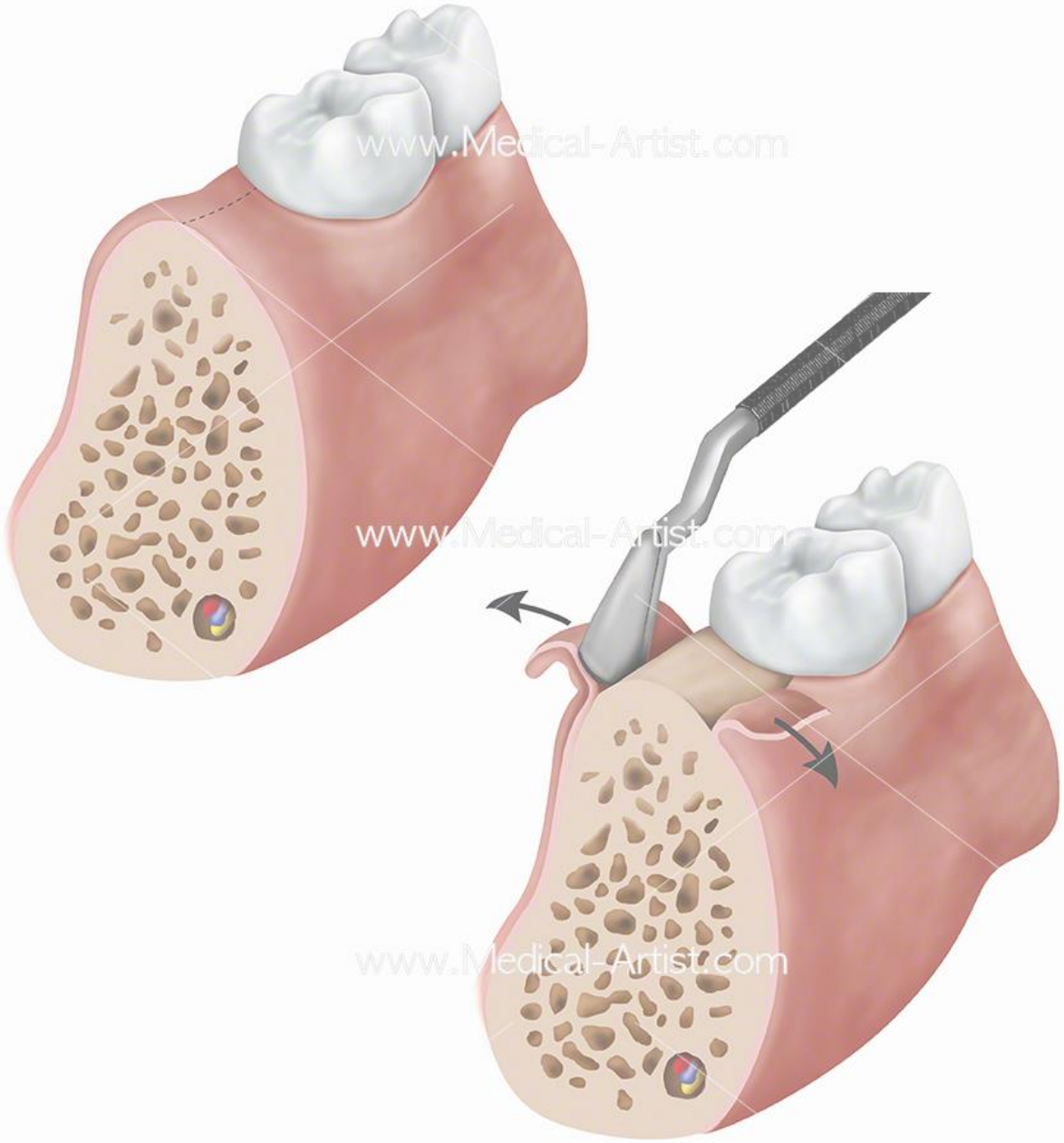


- Punch Decrease available Keratinized mucosa
- Can be used after evaluation of available

2-Exposure techniques

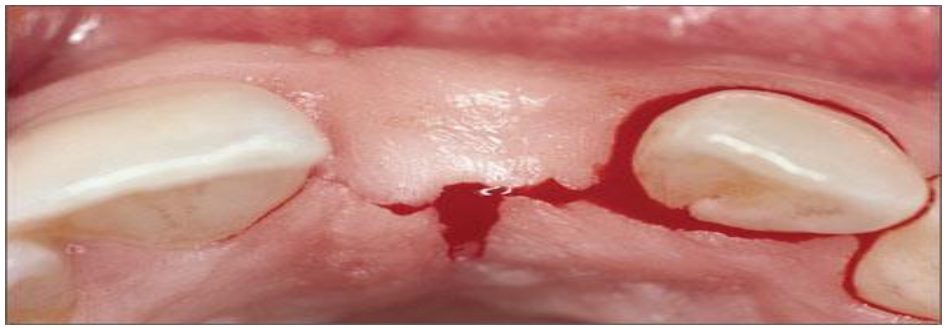
A- Mid Crestal

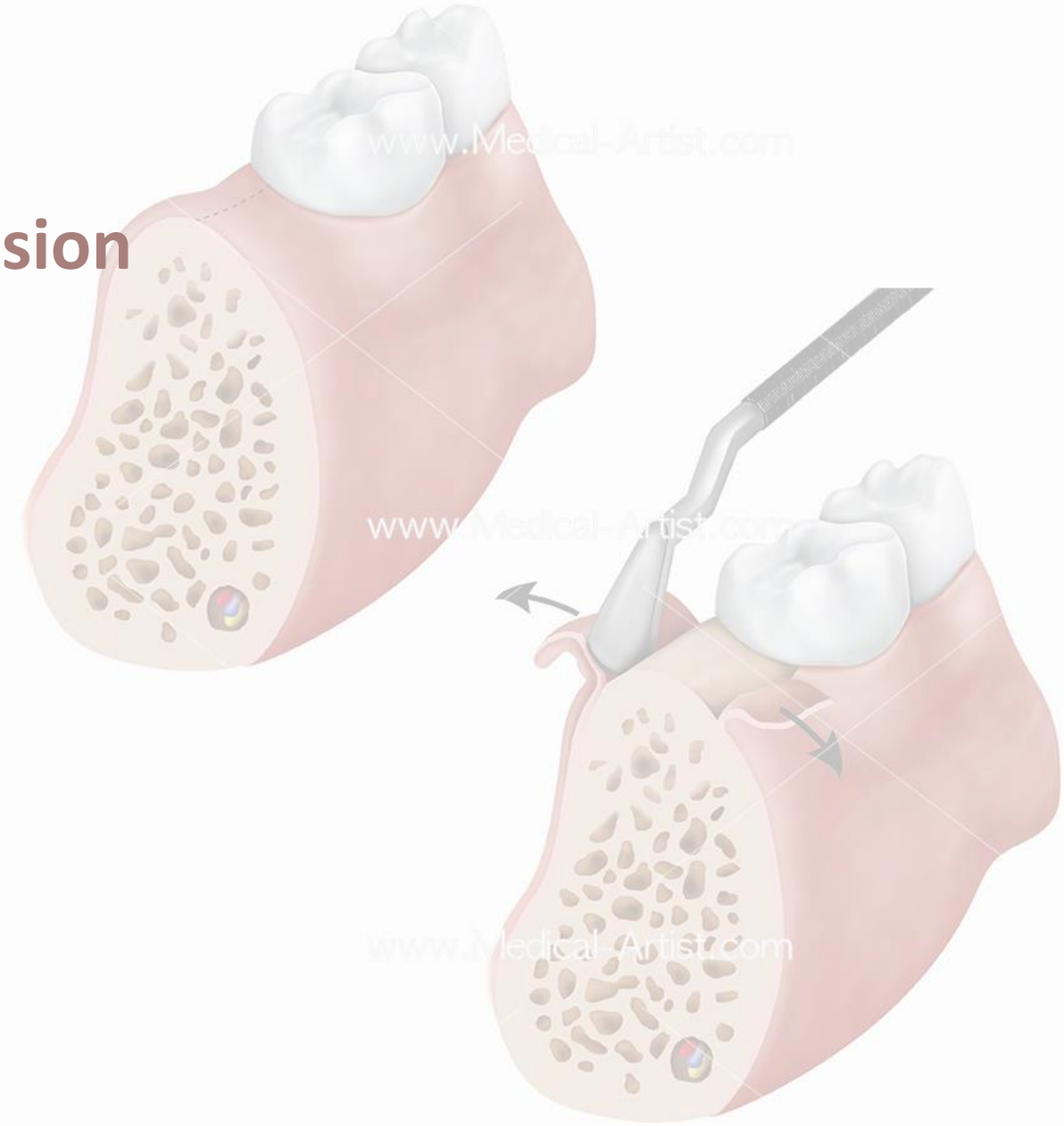




2-Exposure techniques

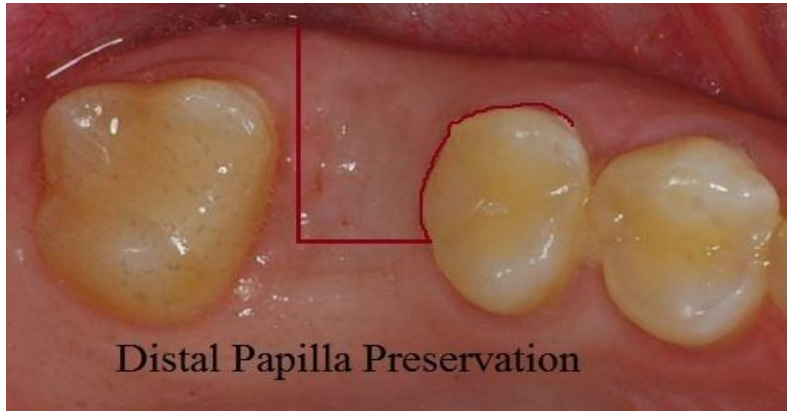
B- Palatal / Lingual Incision

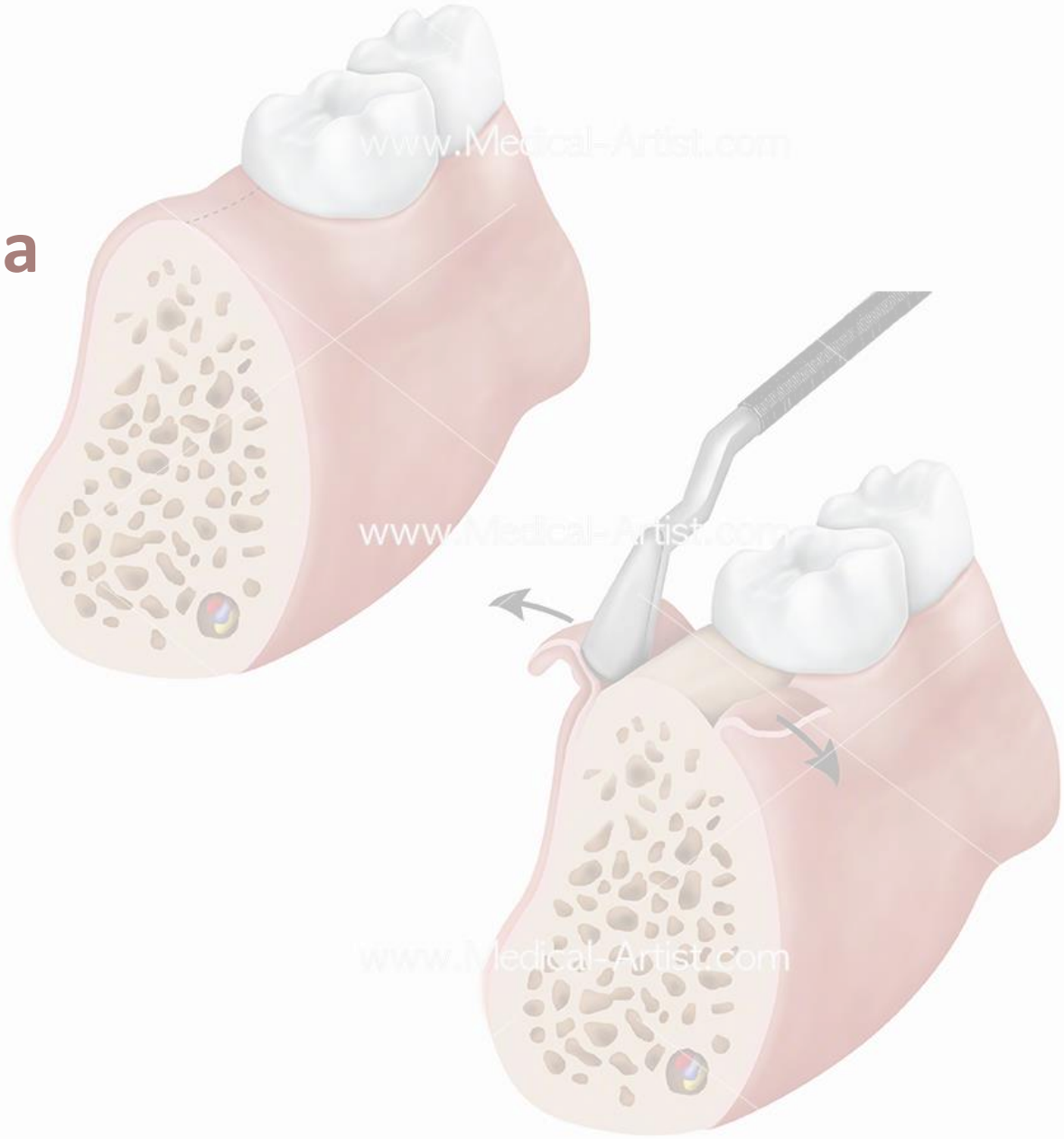




2-Exposure techniques

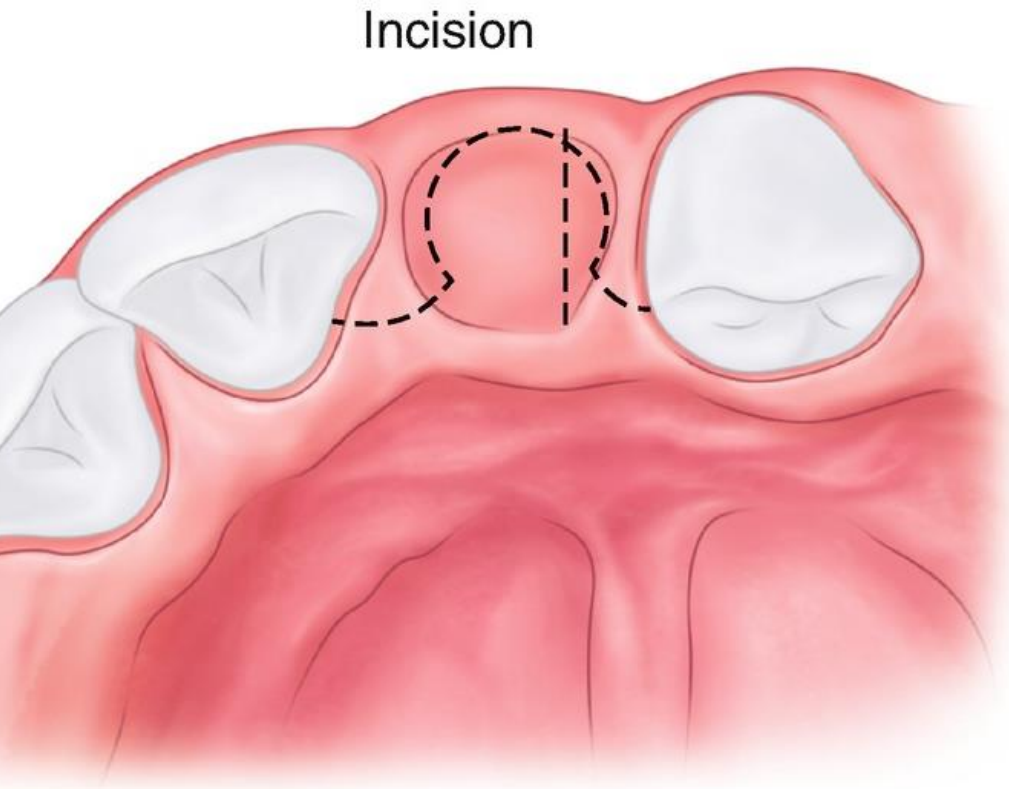
C- Mesial / Distal Papilla preservation Flap

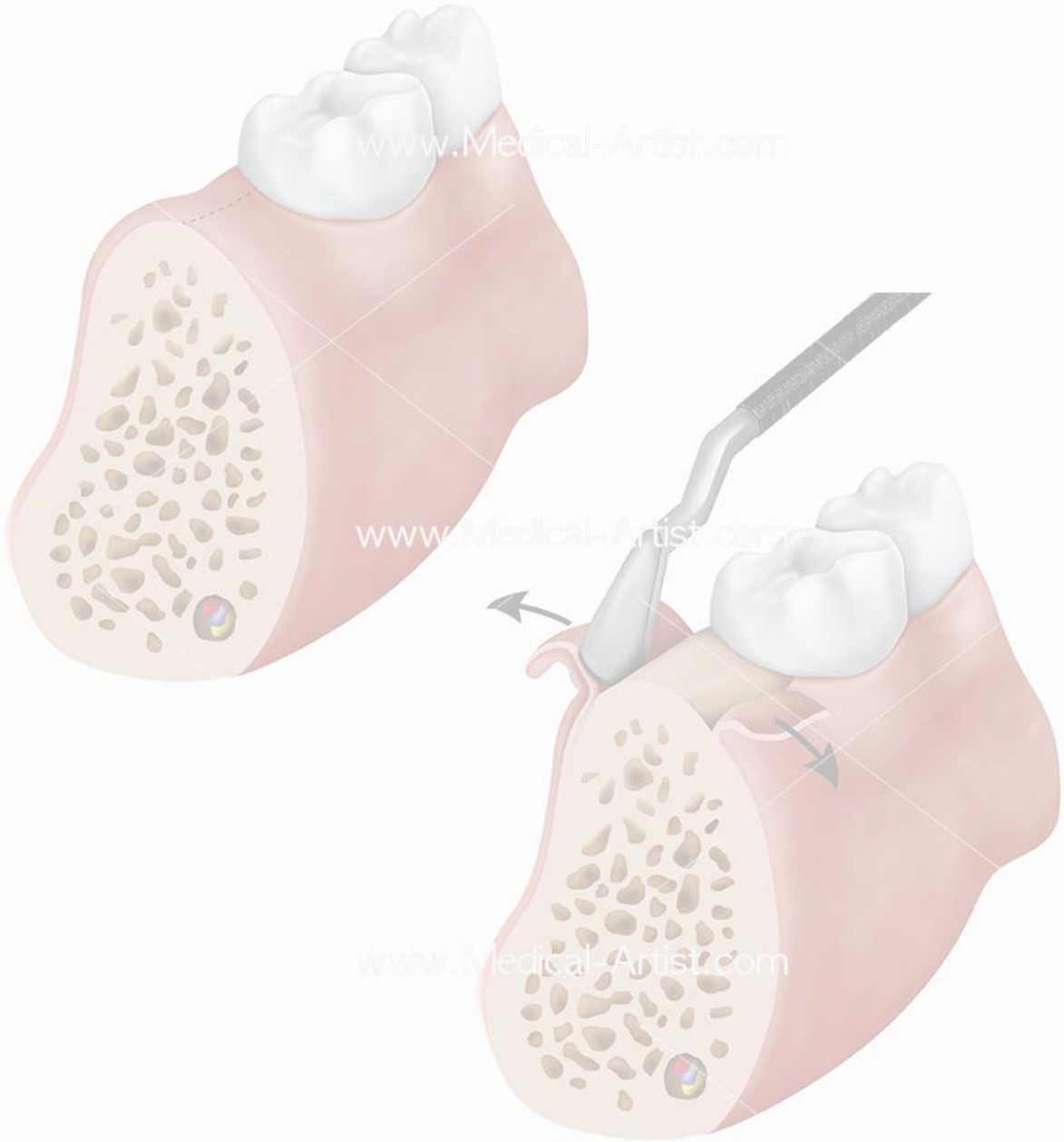




2-Exposure techniques

D- Double Papilla preservation Flap

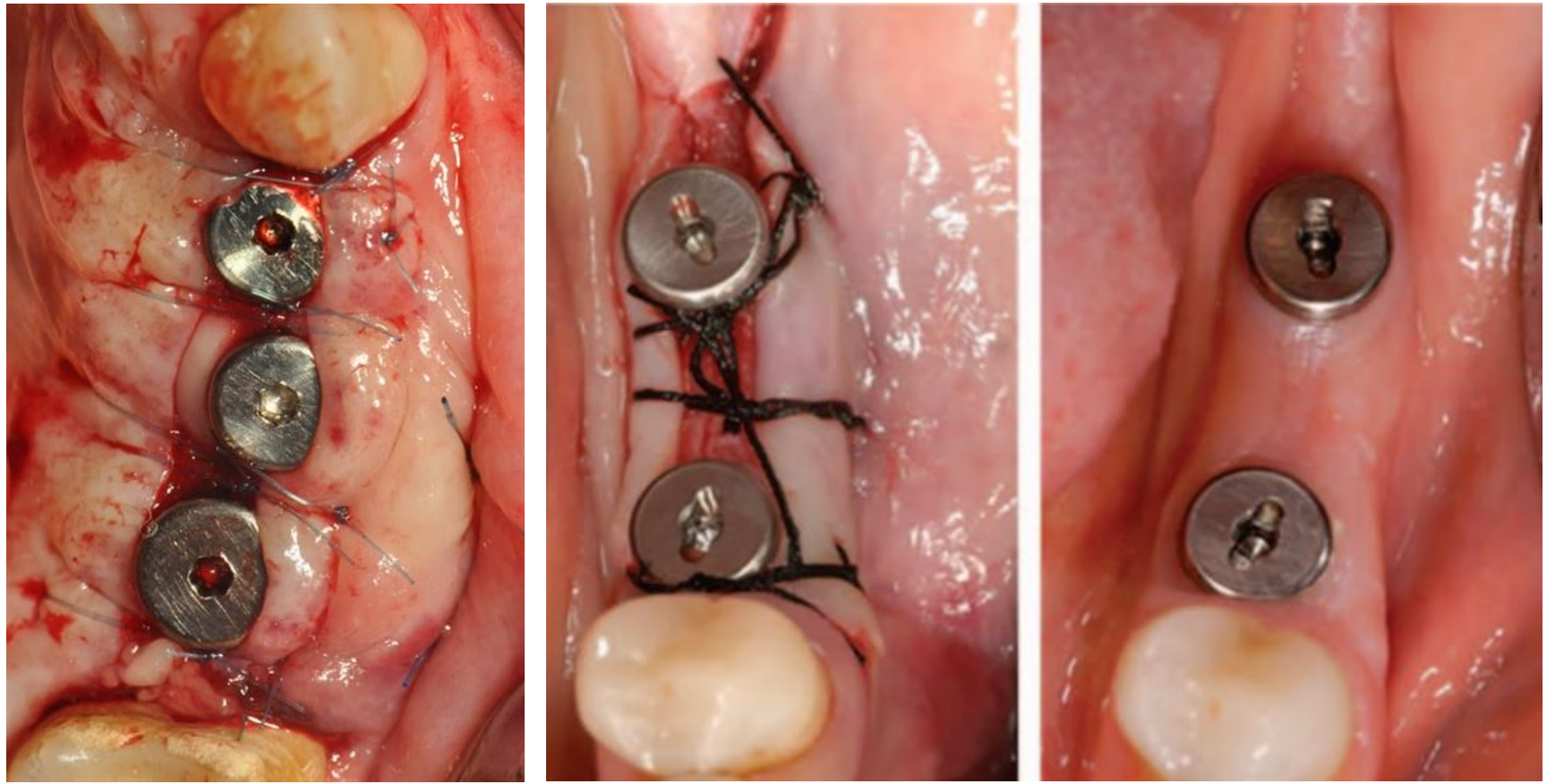




2-Exposure techniques

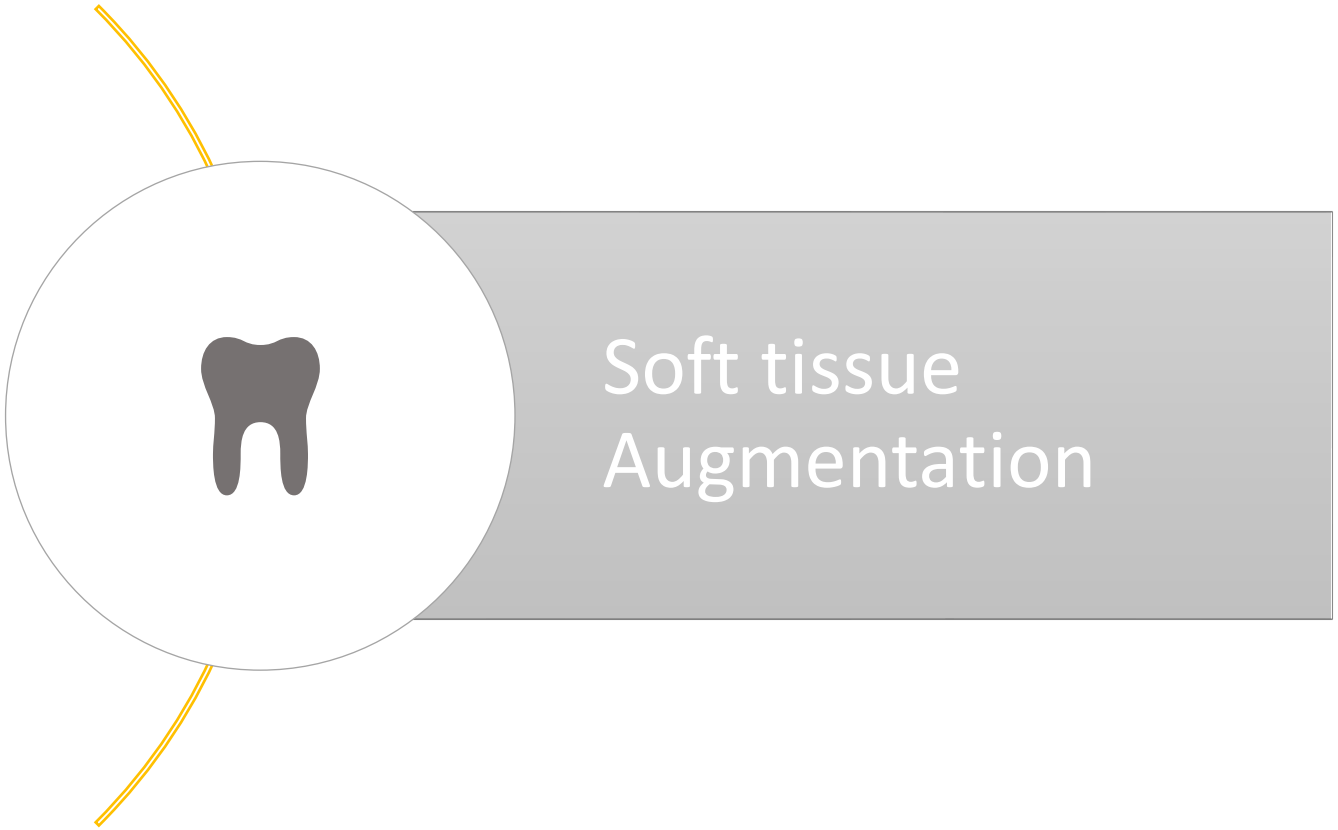
E- Partial Thickness Apical repositioning flap with external vertical mattress suture

It increases the amount of keratinized peri-implant tissue as well as its thickness.

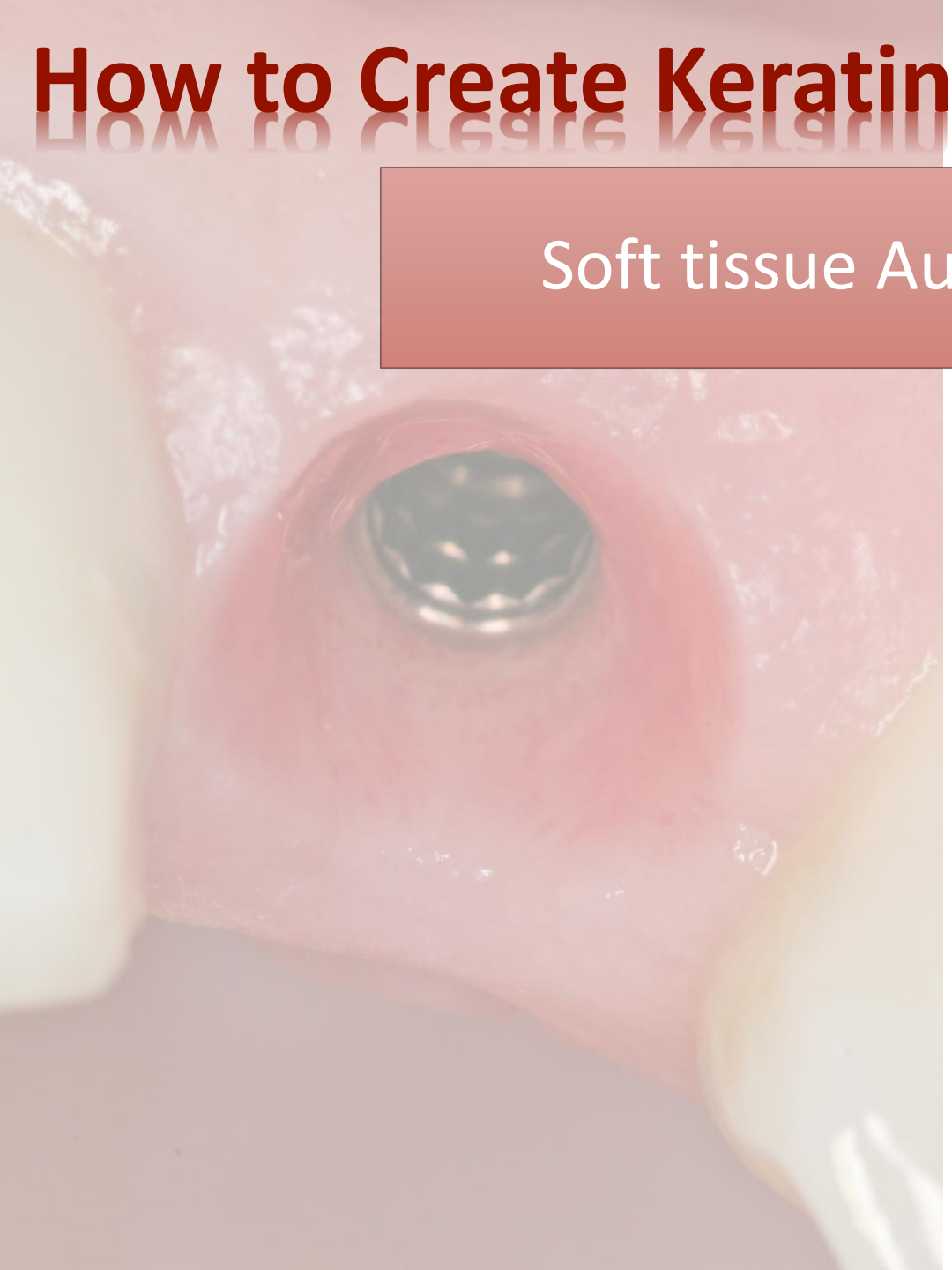


Tissue Keratinization

How to Create



How to Create Keratinized Mucosa



Soft tissue Augmentation

1. Objectives of Soft Tissue Augmentation
2. Augmentation techniques
3. Timings of Augmentation

Biotype - Thickness

Claffey and Shanley defined a gingival thickness of no more than 1.5 mm as thin biotype and 2.0 mm or more as thick biotype

Thin Biotype

Thick Biotype

Biotype - Thickness

How to Evaluate

1. **Visual assessment**
2. **Probe Transparency**
3. **Modified caliper**
4. **Transgingival probing**
5. **Ultrasonic device**
6. **CBCT**

Biotype - Thickness

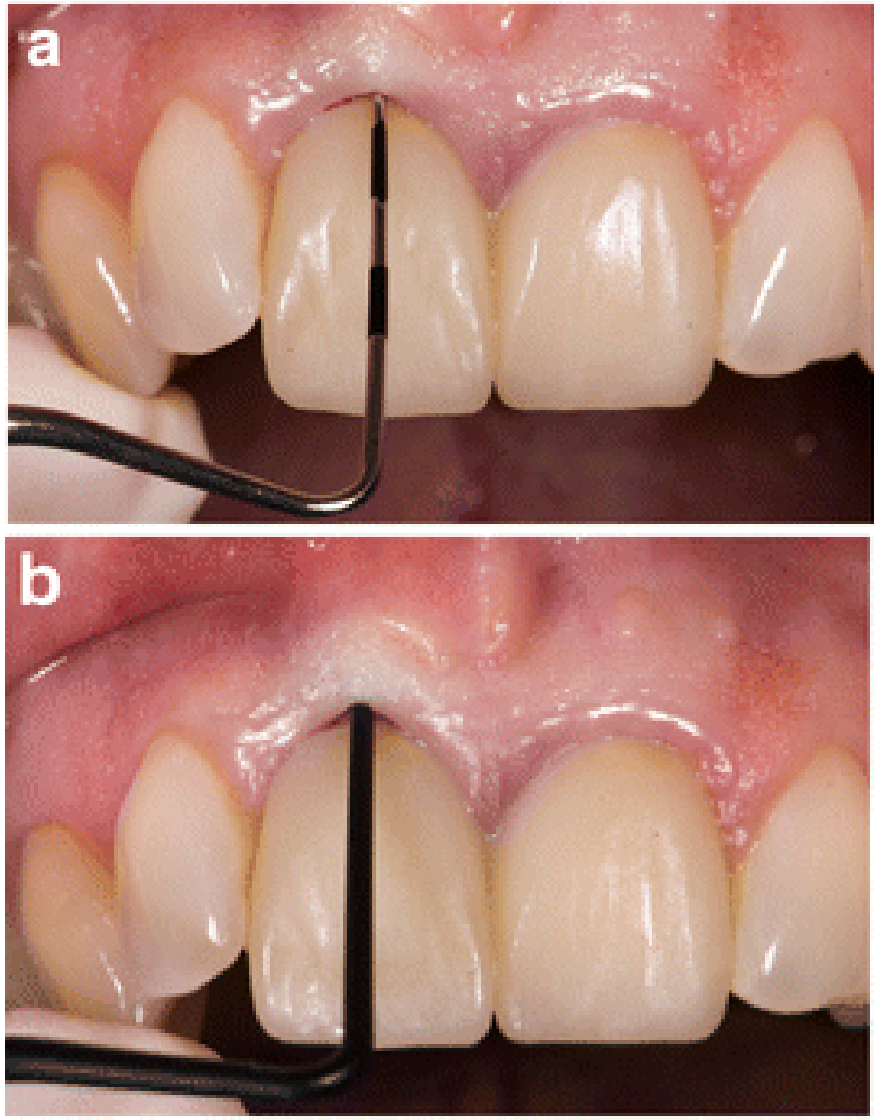
How to Evaluate

1. Visual assessment
2. Probe Transparency
3. Modified caliper
4. Transgingival probing
5. Ultrasonic device
6. CBCT

Biotype - Thickness

How to Evaluate

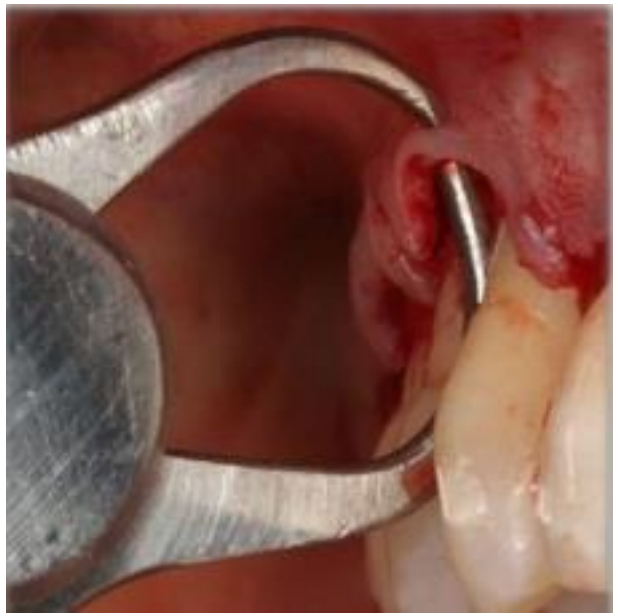
1. Visual assessment
2. Probe Transparency
3. Modified caliper
4. Transgingival probing
5. Ultrasonic device
6. CBCT



Biotype - Thickness

How to Evaluate

1. Visual assessment
2. Probe Transparency
3. Modified caliper
4. Transgingival probing
5. Ultrasonic device
6. CBCT



Biotype - Thickness

How to Evaluate

1. **Visual assessment**
2. **Probe Transparency**
3. **Modified caliper**
4. **Transgingival probing**
5. **Ultrasonic device**
6. **CBCT**

Biotype - Thickness

How to Evaluate

1. Visual assessment
2. Probe Transparency
3. Modified caliper
4. Transgingival probing
5. Ultrasonic device
6. CBCT

Biotype - Thickness

How to Evaluate

1. Visual assessment
2. Probe Transparency
3. Modified caliper
4. Transgingival probing
5. Ultrasonic device
6. CBCT

Biotype - Thickness

How to Create

Soft tissue Augmentation

Pouch accompanied by Connective Tissue Graft

Create tunnel using your standard methods.

Close the FS TFU handles & walk them through the tunnel.

Slightly open the handles & grasp the graft material.

Slowly pull or withdraw the graft through the tunnel to be placed in proper position.

Biotype - Thickness

	THIN BIOTYPE	THICK BIOTYPE
		
Soft tissue thickness	≤2mm	>2mm
Facial height of peri-implant mucosa (equivalent of biologic width around teeth)	<3mm	>4mm

Biotype - Thickness

Impingement of peri-implant mucosa	Angular defect	Horizontal bone loss
Immediate implant placement in non ideal position	More recession More papilla loss	Less recession Less papilla loss
Platform switching to minimize bone loss	No benefit	Potential benefit
Restorative components	Zirconium preferred	Zirconium preferred Titanium possible

Why to Augment?

Peri-implant Recession

Papilla Loss

Why To Augment

Color or texture Alteration

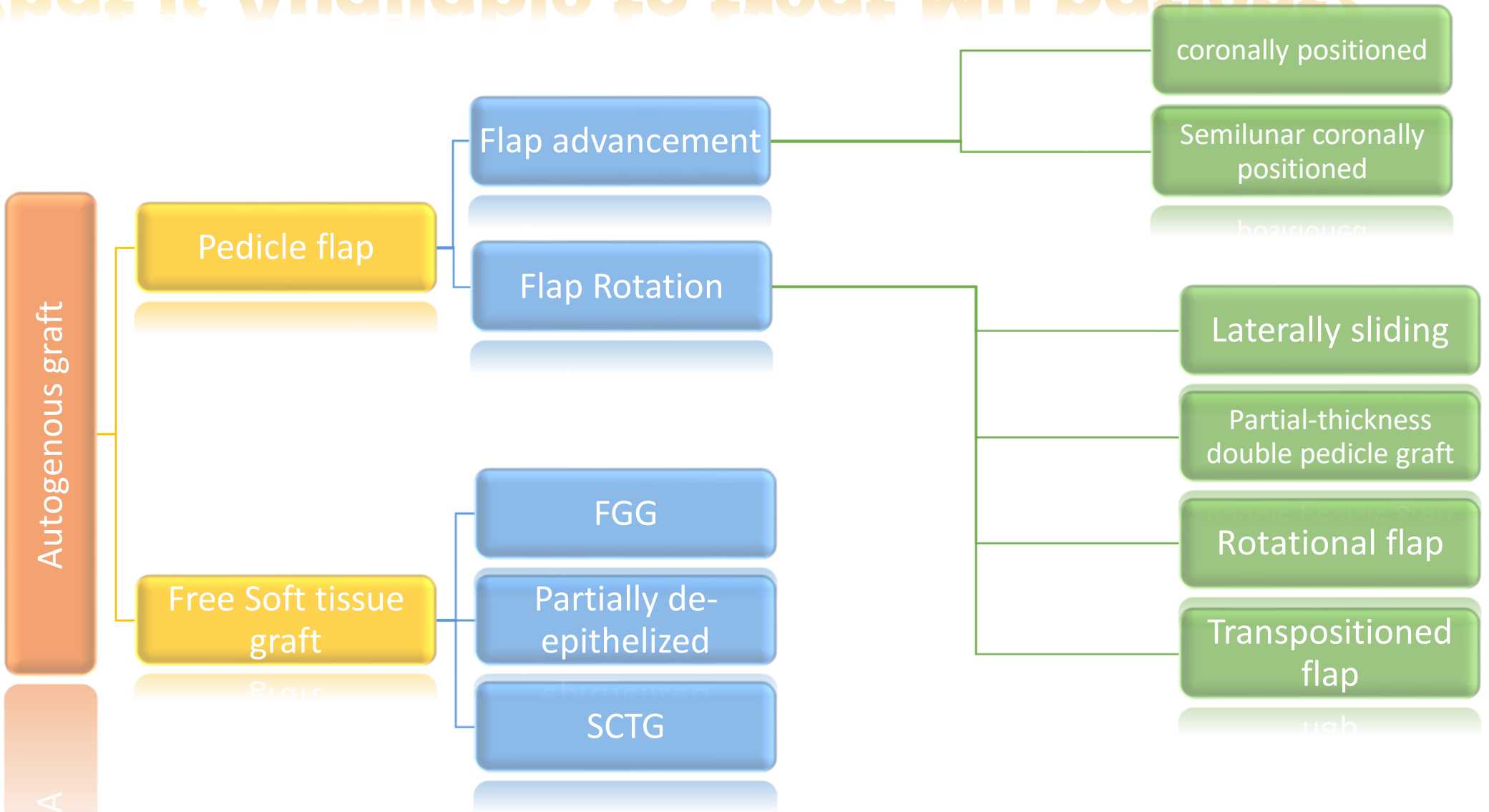
Facial Volume Loss

Frizzera et al, 2019

Do you think we have enough KG

What Is Available To Treat Our Patients?

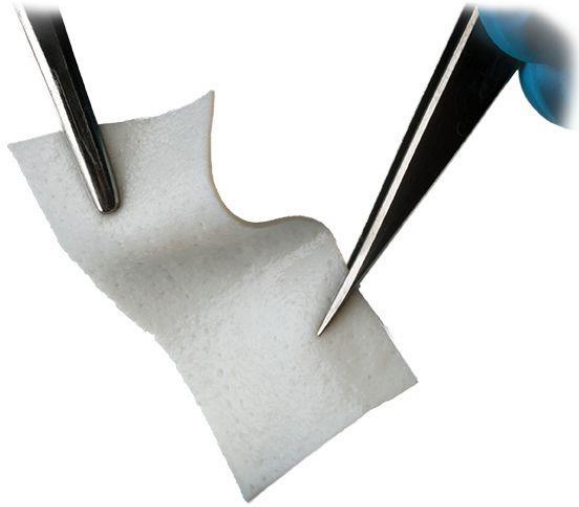
What is Available to treat My patient?



What is Available to treat My patient?

Alternatives to Autogenous Soft Tissue Grafts

- **Allografts**
  such as acellular dermal matrix (ADM)
- **Xenograft**
  include thick collagen matrice (Mucograft)
- **Living Cellular Construct**
  - Platelet-rich fibrin (PRF)
  - LCS is an allogenic graft
    (keratinocytes + fibroblasts in bovine collagen)



Surgical principles of soft tissue grafting

- Recipient site must provide graft vascularization
- Recipient site must provide rigid immobilization of the graft tissue
- Recipient site must provide Adequate hemostasis
- Donor tissue must be large enough to facilitate immobilization at the recipient site and to take advantage of the peripheral circulation when root or abutment coverage is the goal
- Adequate graft thickness (1.25mm) preferable.

Soft tissue Augmentation

Free Soft tissue Grafts

- It is A soft tissue graft that is completely detached from one site and transferred to a remote site.
- No connection with the donor site is maintained

Free Gingival Grafts

Indications

- To increase keratinized tissue around implants.
- To increase keratinized tissue under removable prostheses
- To increase vestibular depth

Disadvantages

- Heals with white band so is not favorable in High esthetic demand
- Large, uncomfortable donor site
- Graft site, slow uncomfortable healing

Free Gingival Graft

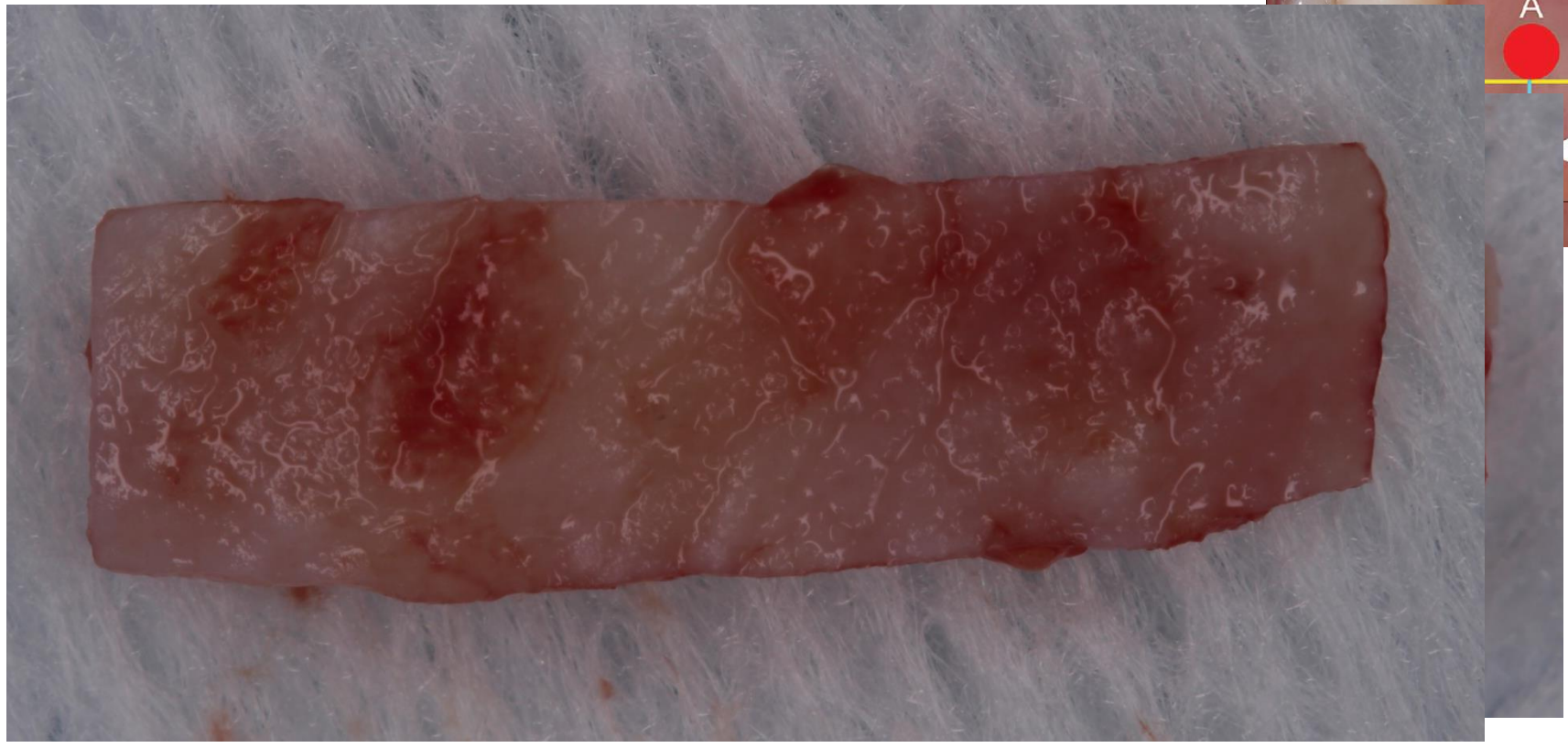
- **Surgical Technique**

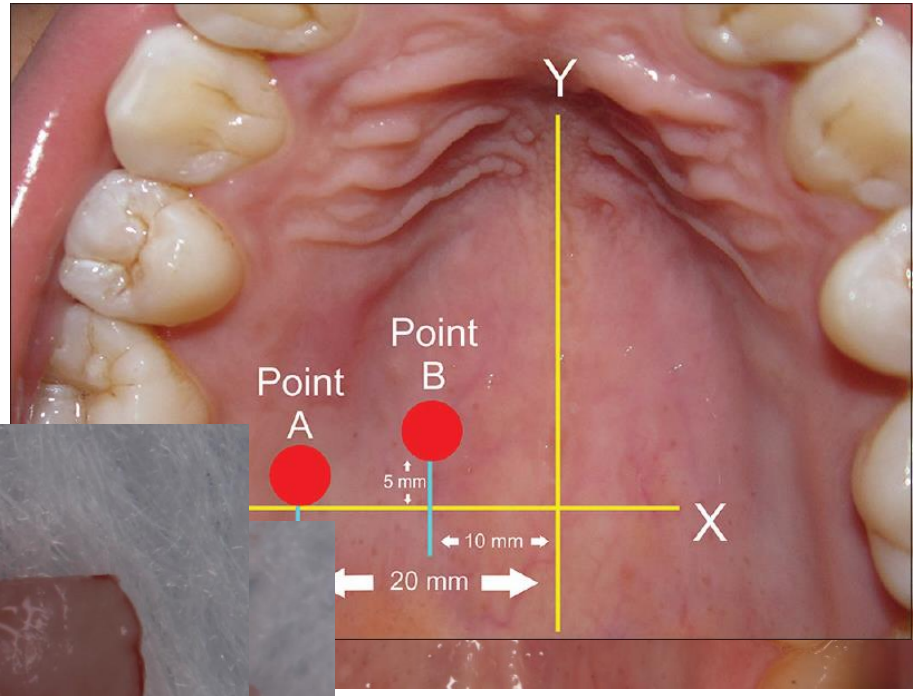
  Recipient design

Free Gingival Graft

- **Surgical Technique**

Donor design





Free Gingival Graft

- **Surgical Technique**

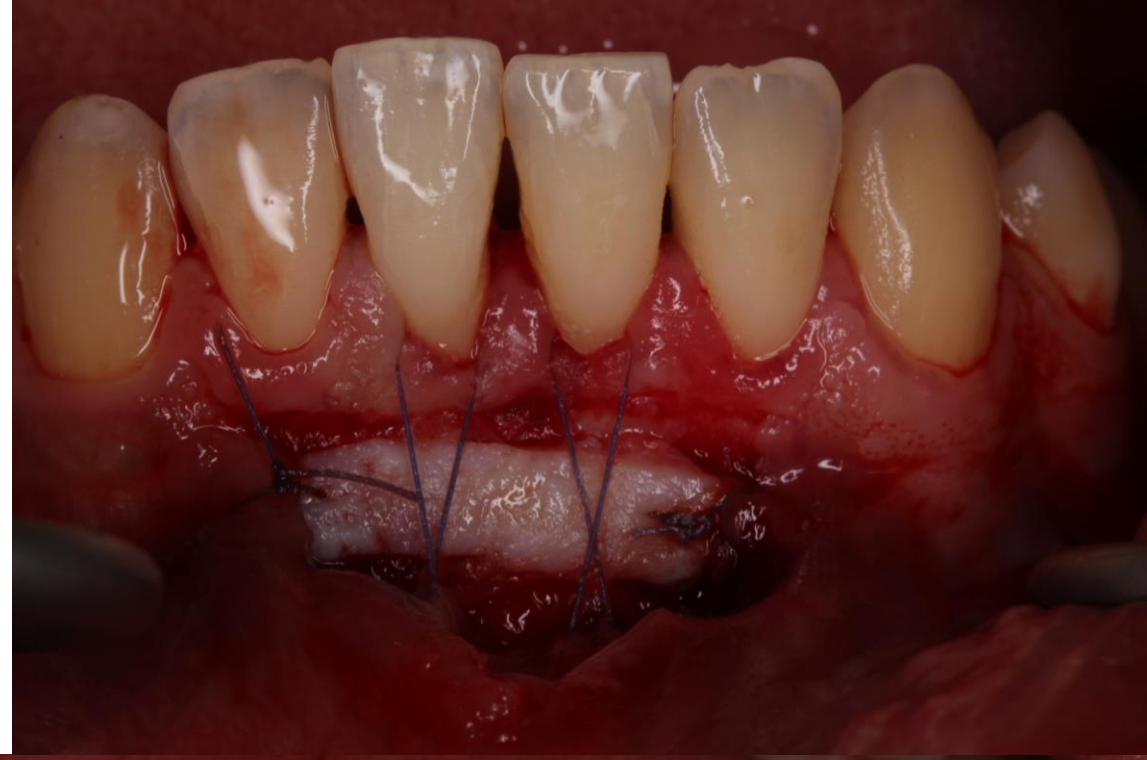
  Recipient site

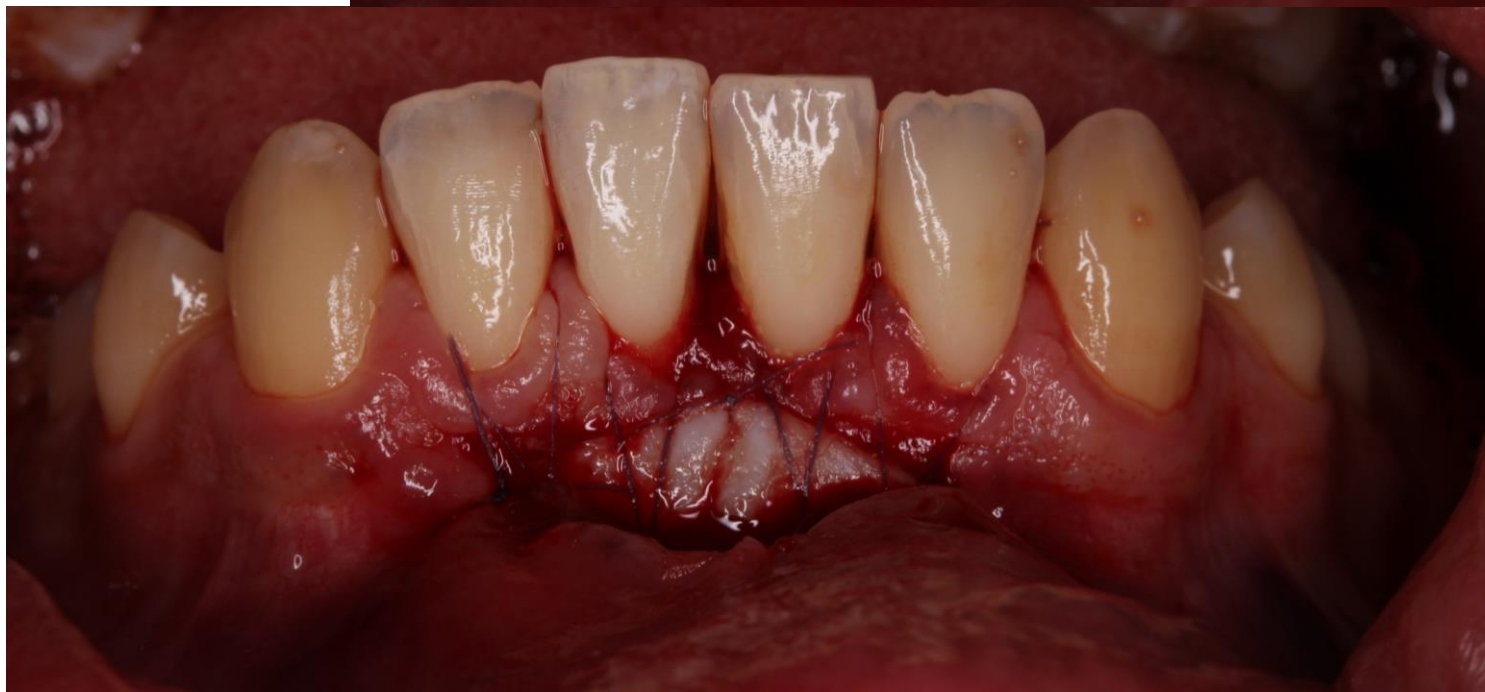
Free Gingival Graft

- **Surgical Technique**

  Recipient design

    - Fixation of graft

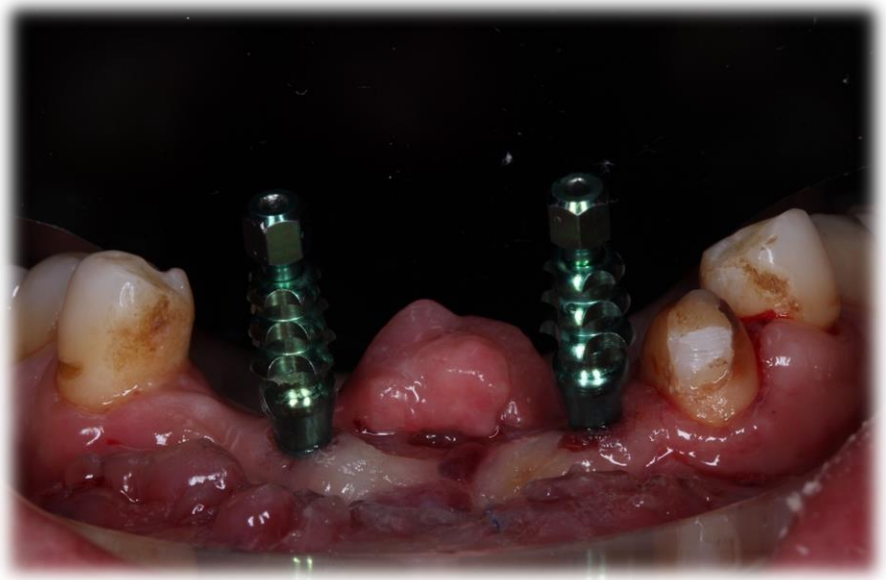




Free Gingival Grafts

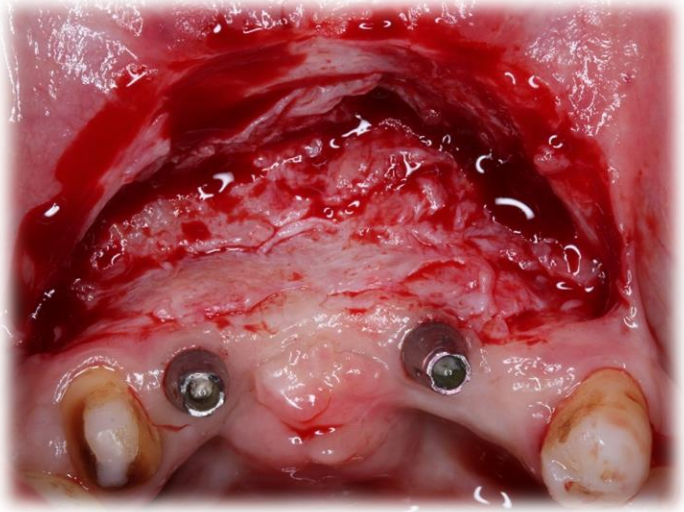
Free Gingival Grafts

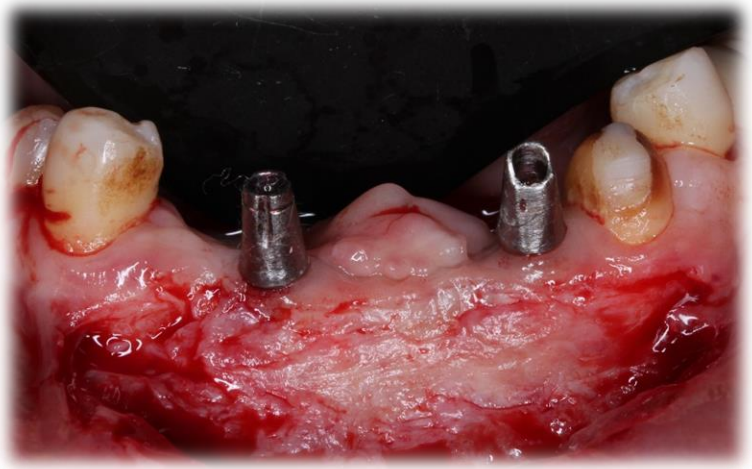
Implant exposure after 4 months from base line



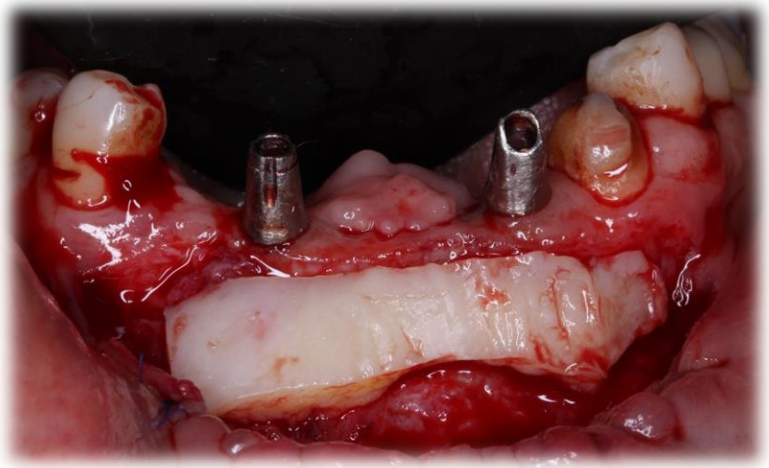
Insufficient zone of KG

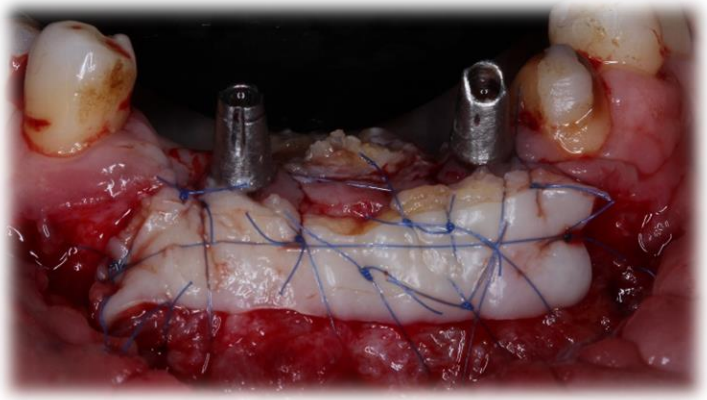
Soft tissue augmentation

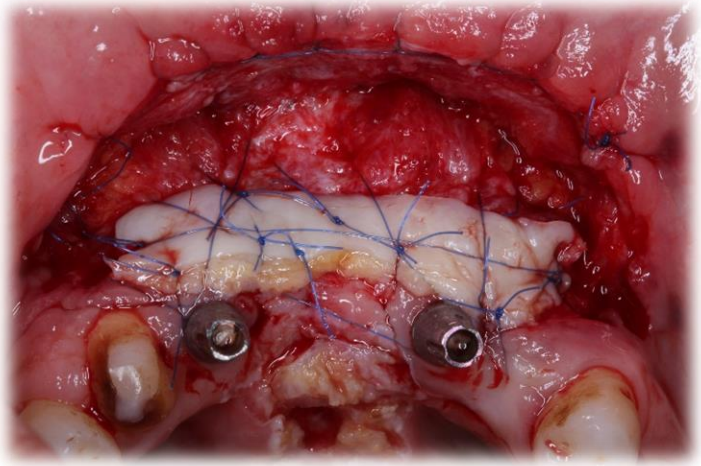




Recipient site preparation

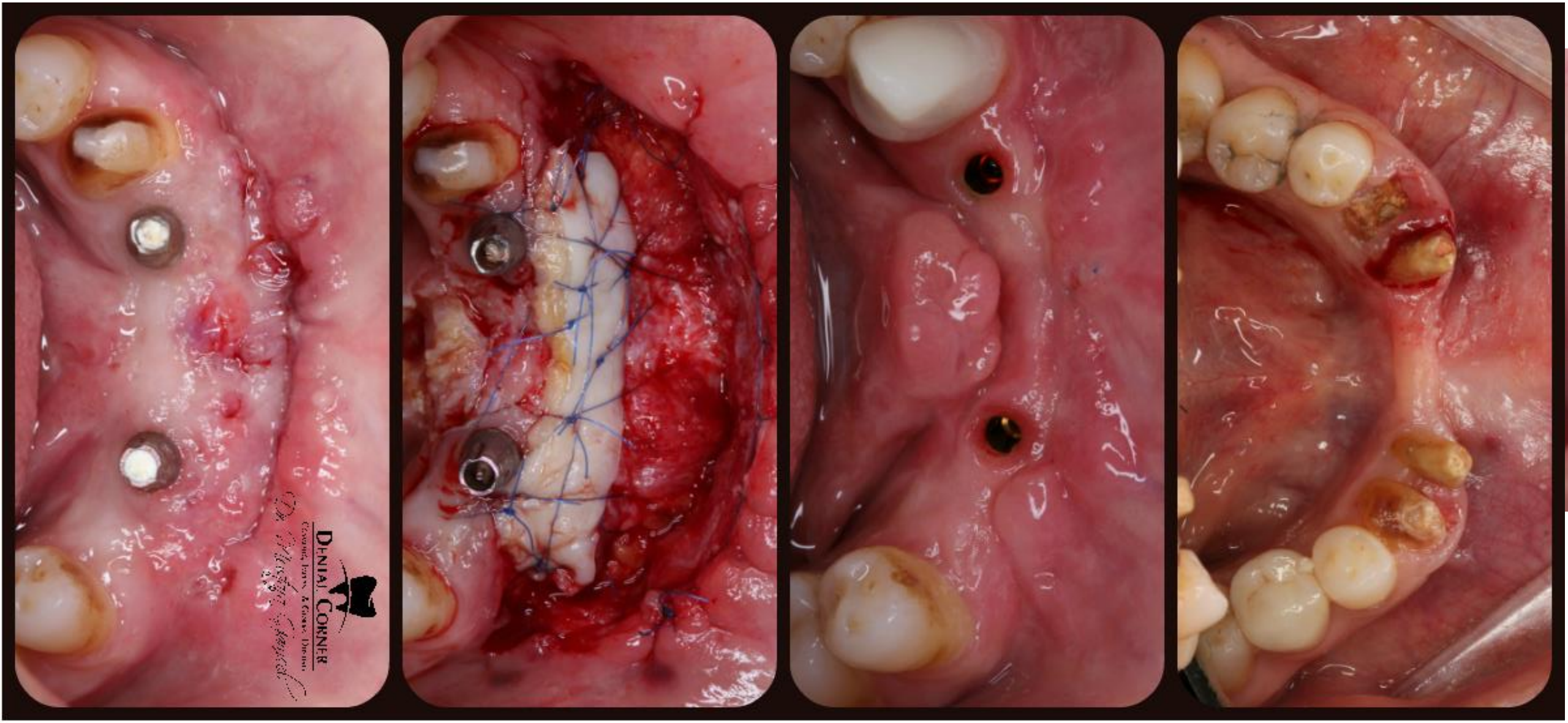




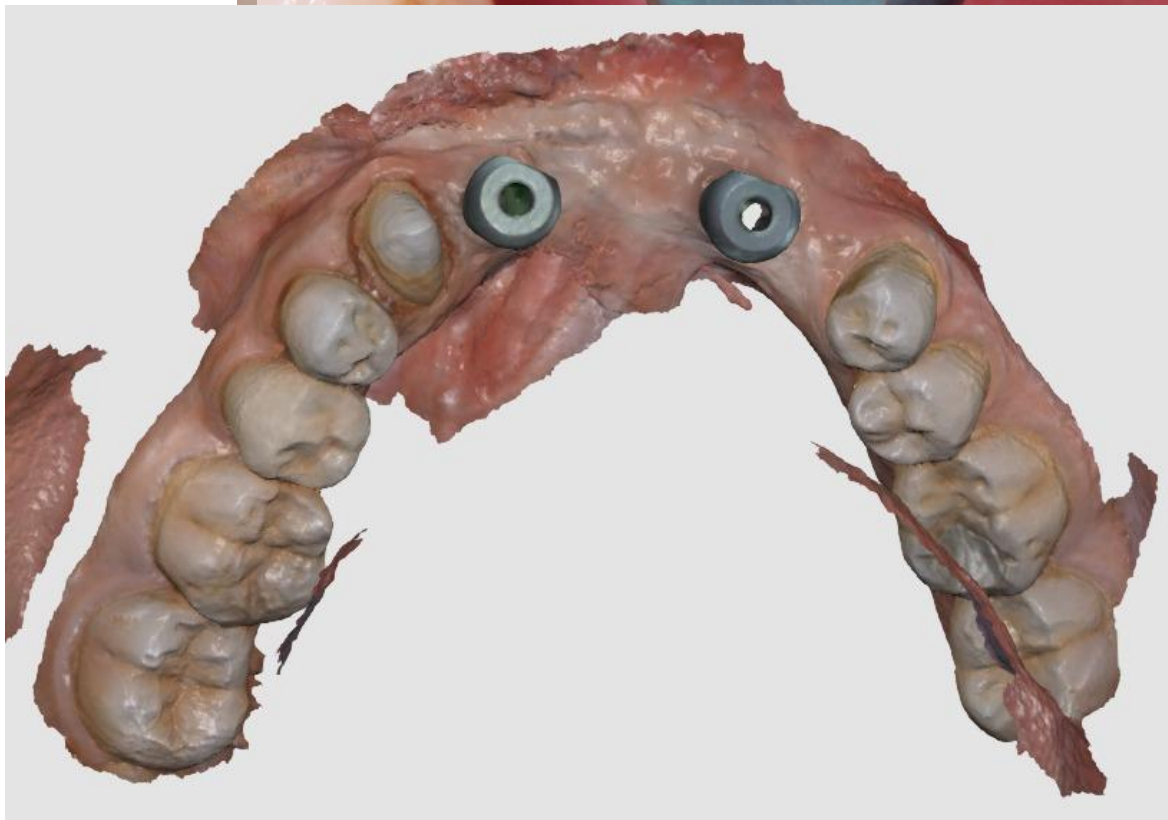


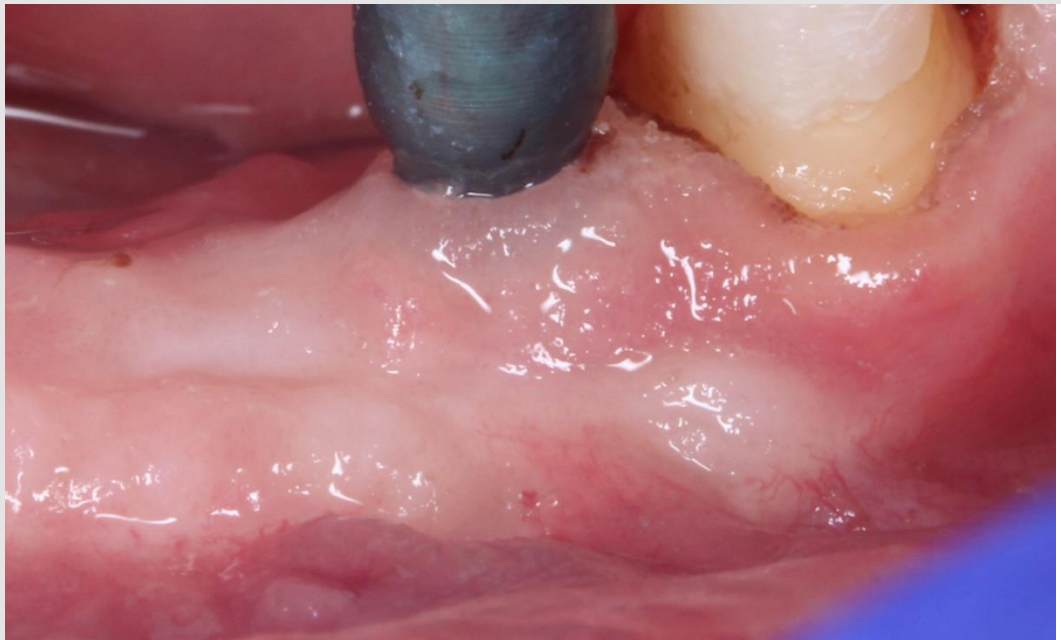
FGG in place

3 weeks post operative




Scan body in Place for D





Sub-epithelial Connective Tissue Graft (CTG)

- A detached connective tissue graft that is placed beneath a partial thickness flap.
- This variation of the free gingival graft provides the tissue graft with a

Connective Tissue Graft

Advantages

- Smaller donor site (than FGG)
- Smaller recipient site (than FGG)
- Less soreness overall (than FGG)
- Excellent esthetics
- Better blood supply

Disadvantages

- Two surgical sites
- Technique sensitive

Connective Tissue Graft

- **Surgical Technique**

  Incision design (tunnel technique)

  - Create “pouch” using full/split thickness incision between gingiva and bone/root
  - Maintain papilla for bi-laminar blood supply
  - Extend incision to adjacent teeth
  - Undermine flap

Connective Tissue Graft

- **Surgical Technique**

Donor site incision (Buser)

- First palatal incision perpendicular to long axis of teeth

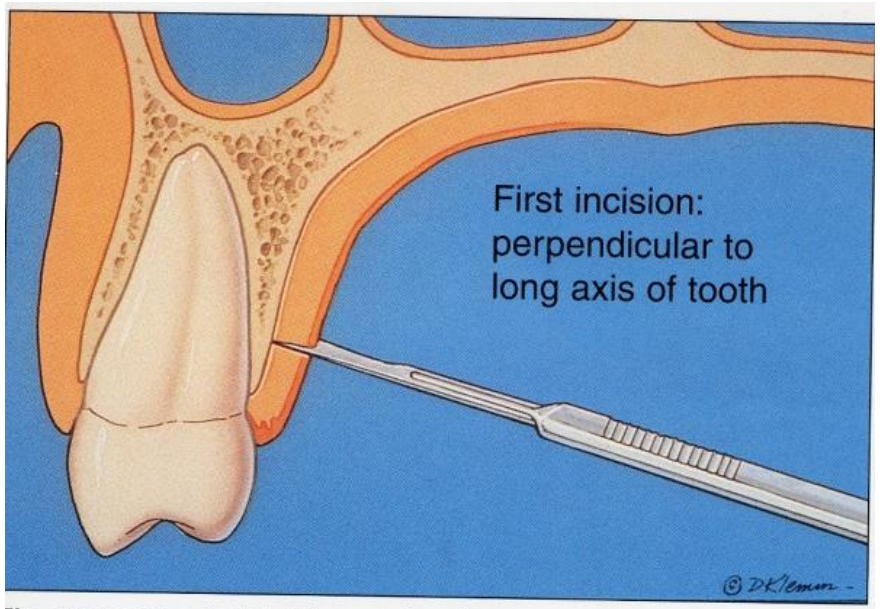


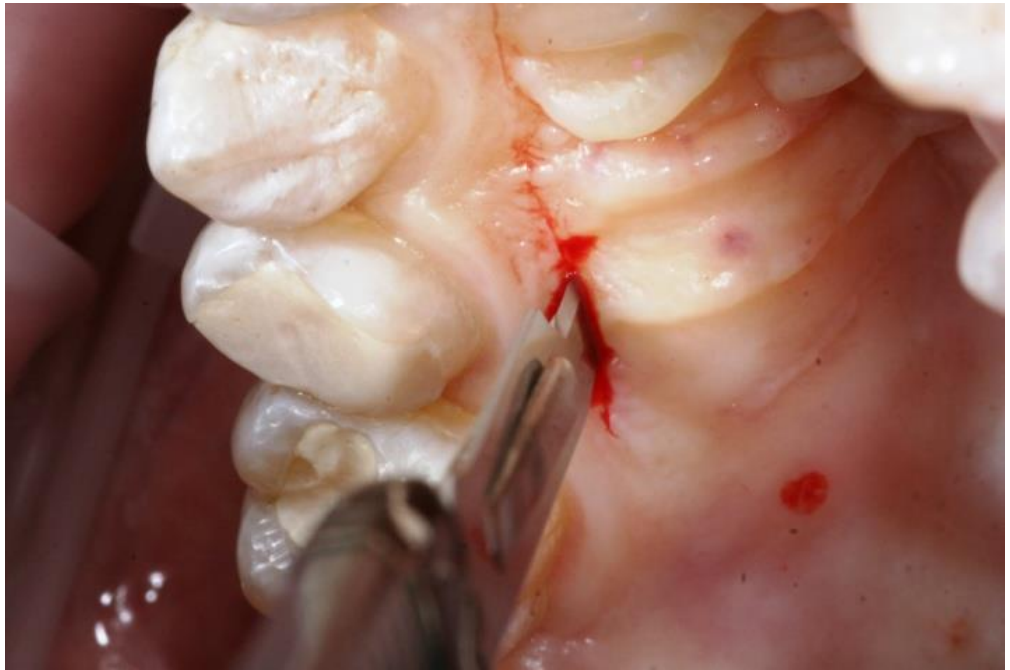
Fig 24-2a The first incision at the donor site on the palate is made approximately 2 to 3 mm apical to the gingival margins of the teeth.

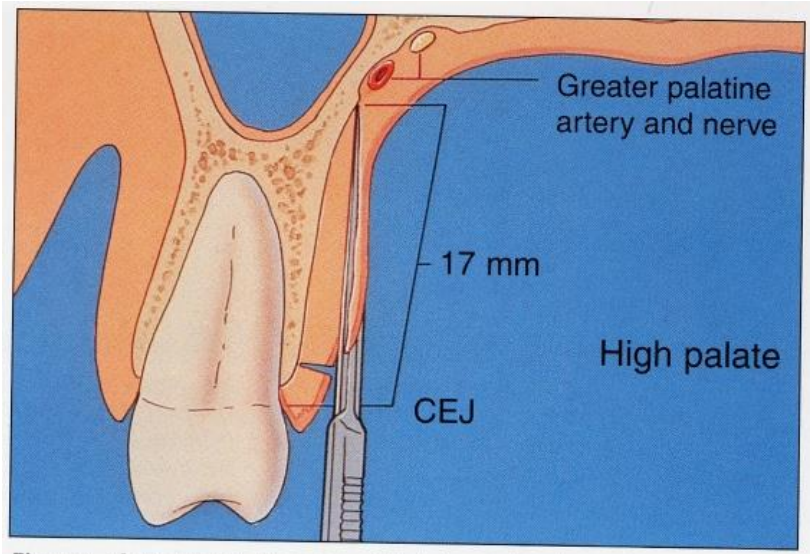
Connective Tissue Graft

- **Surgical Technique**

Donor site incision (Buser)

- Second palatal incision parallel to long axis of teeth





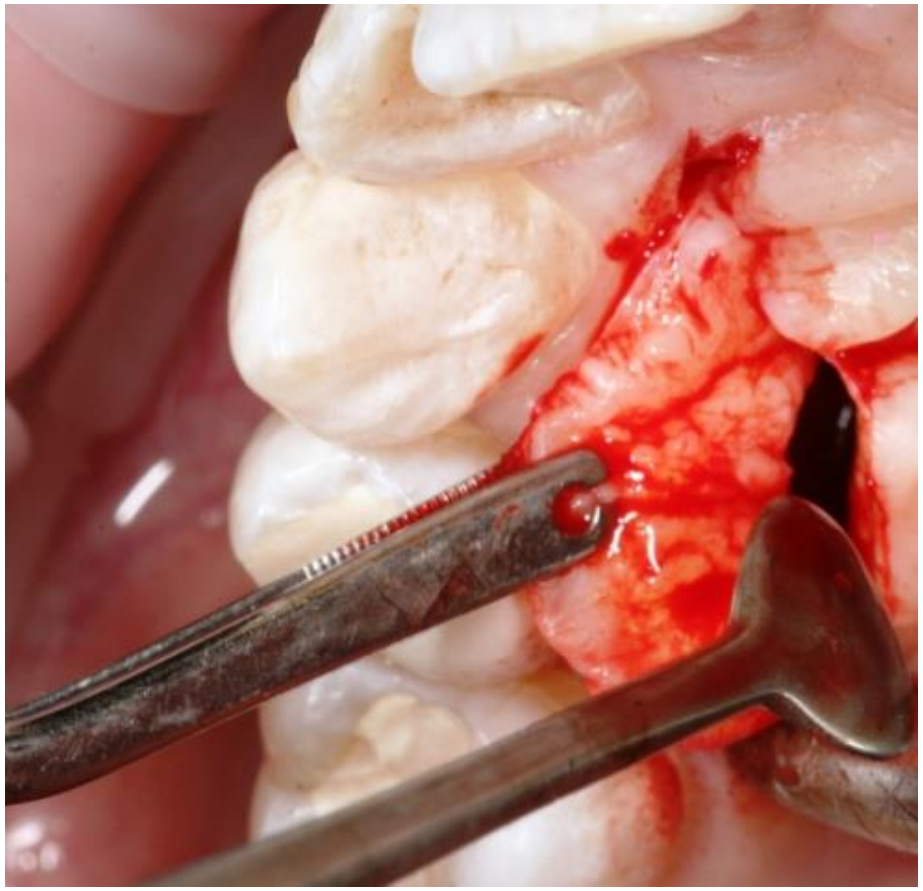
Figs 24-2b to 24-2d The second incision at the donor site is made parallel to the long axis of the tooth, 1 to 2 mm apical to the first incision. The more apical the incision, the thicker the donor tissue will be. The extent of the apical incision is determined by the height of the palate.

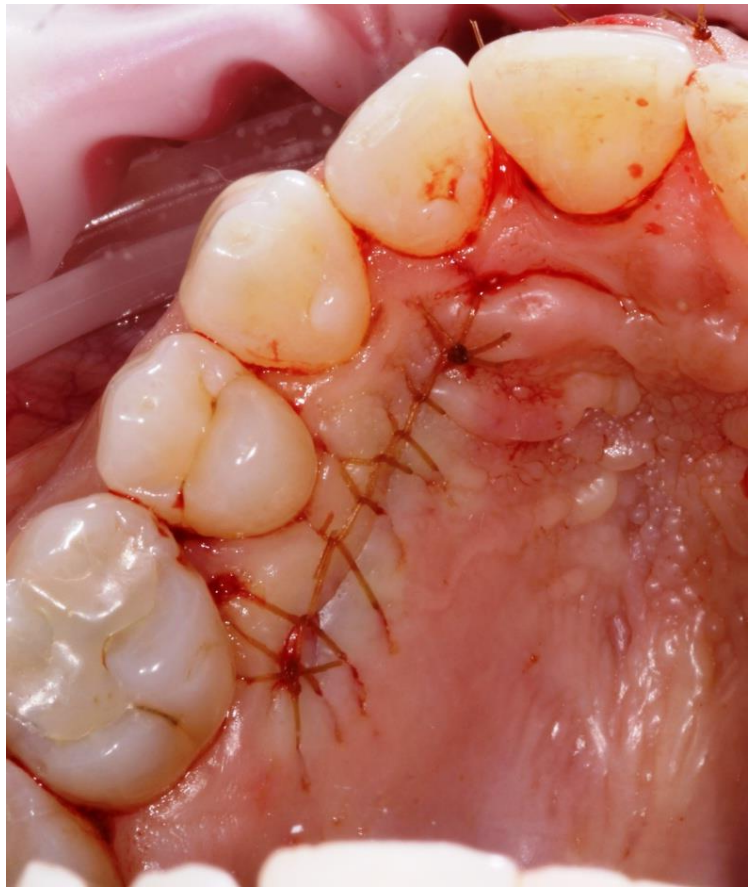
Connective Tissue Graft

- **Surgical Technique**

  Donor site

  - Harvest tissue
  - Suturing





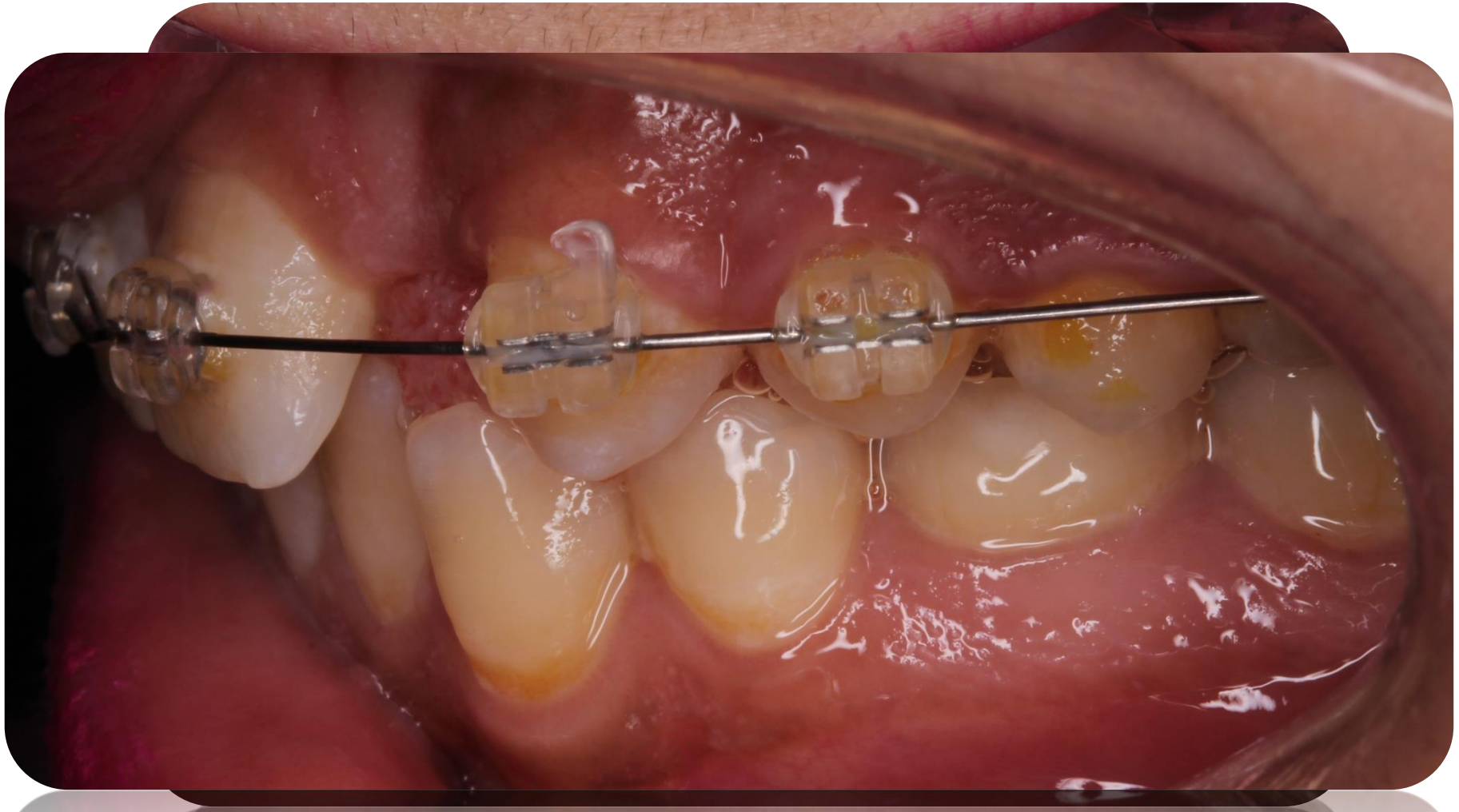
Connective Tissue Graft

- **Surgical Technique**

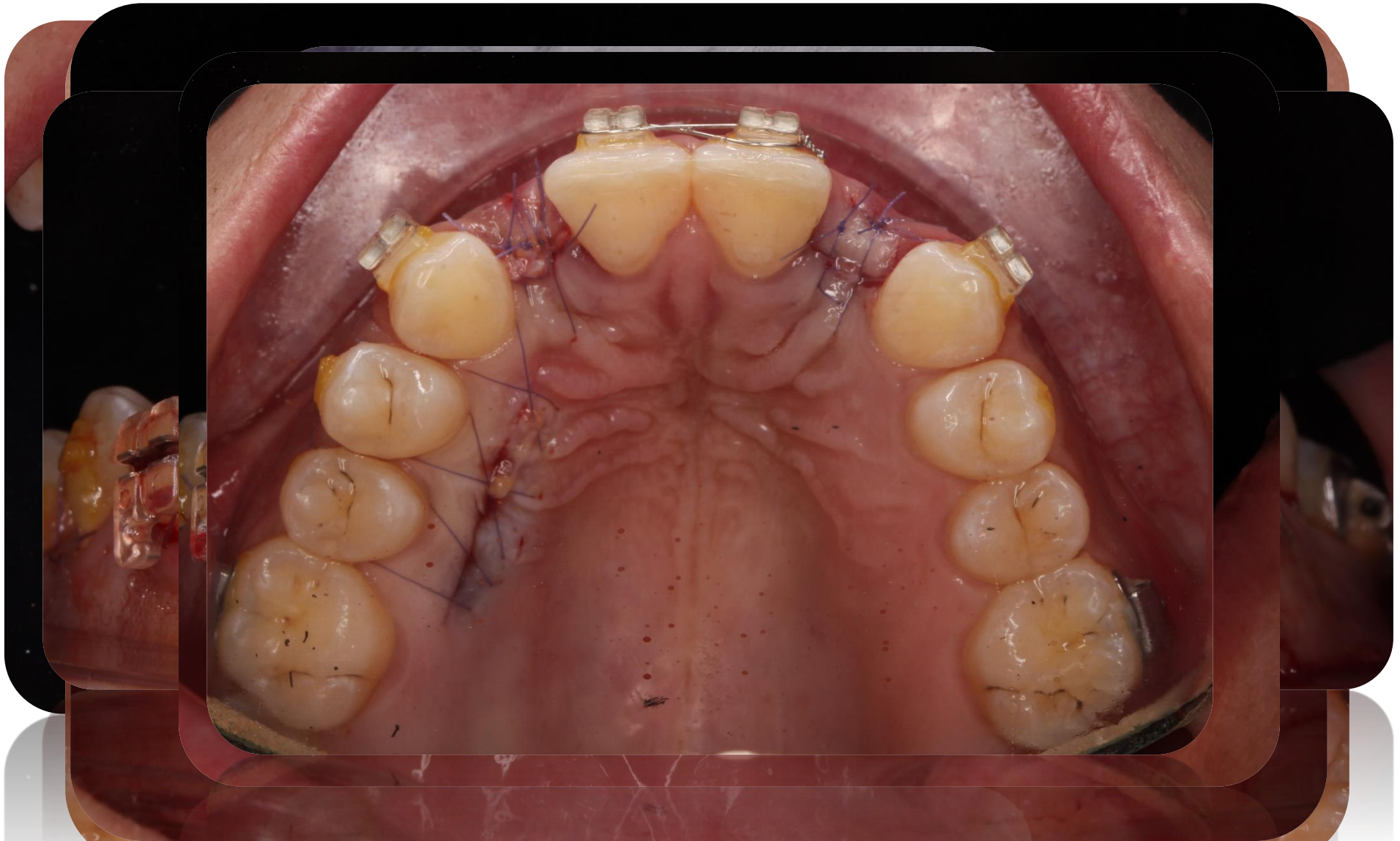
Recipient site

- Insert graft into tunnel
- Suture using interrupted and sling sutures

Soft tissue augmentation using SCTG



Point drill



Graft Thickness

FGG

- The thick free gingival graft can be used for covering exposed implant surface
- a 1.25-mm or thicker graft should be used
- The thick graft undergoes greater 1ry contraction, but less the 2ry contraction
- Thick grafts are more resistant to future recession.
- Thick grafts have “creeping attachment” increase in coverage over a 1-year period following surgery
- Thick grafts result in less esthetically

SCTG

- The autogenous SCTG is divided by thickness of the donor tissue into 3 categories:
- 1. Thin (0.5–0.8 mm)
- 2. Average (0.9–1.4 mm)
- 3. Thick (1.5 to >2 mm)

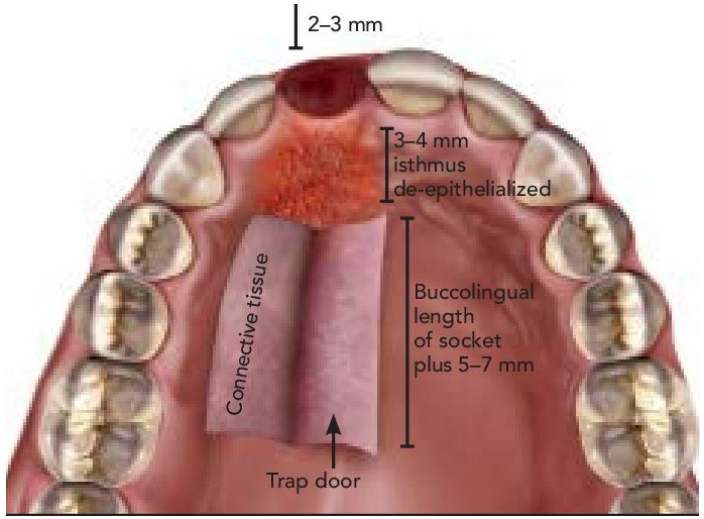
Rapid revascularization

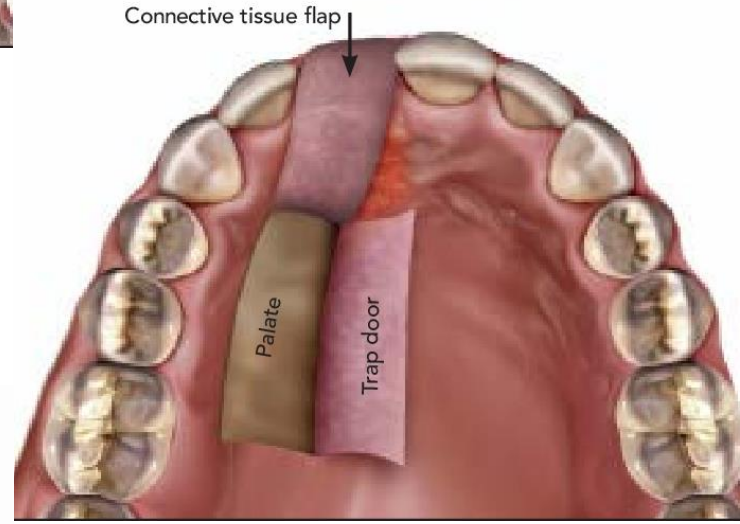
prolonged period of revascularization and delayed healing

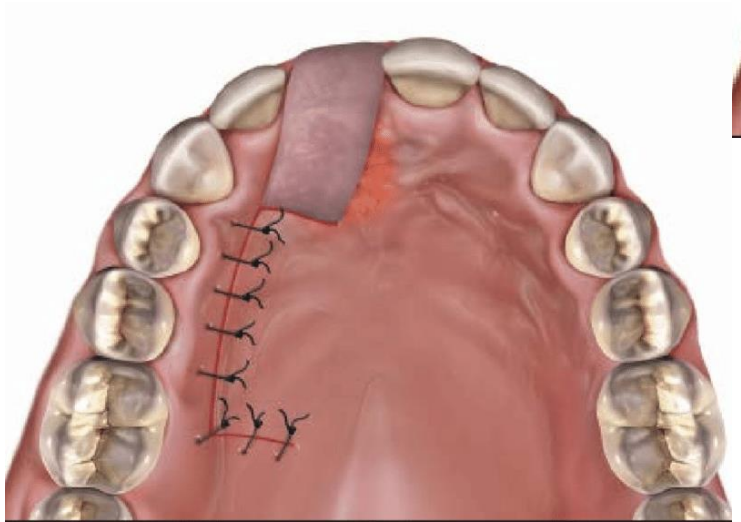
- Which effect amount of shrinkage and the rate of healing of the graft

Pedicle flap

- a pedicle connective tissue graft is prepared at the lateral palatal area of the defect.
- Then mobilized and rotated into the pouch prepared at the recipient site.



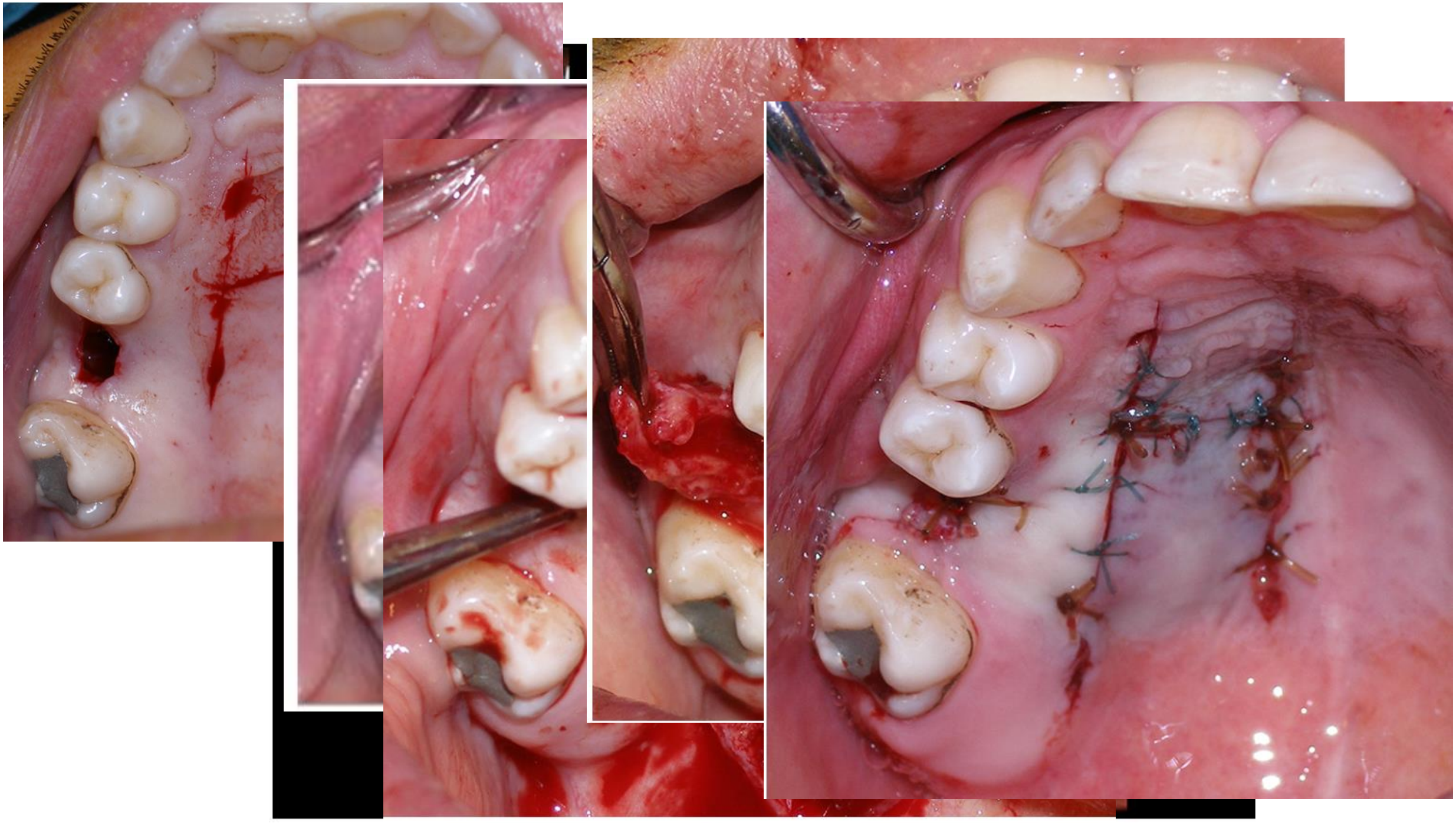




Vascularized interposition periosteal (VIP-CTG) connective tissue graft technique *Sclarin 2003*

In recent RCT comparing the VIP-CT graft vs SCTG.

- After 6 months, a statistically significant increase in median volume for sites treated with the VIP-CT graft technique (1.18 mm; range: 0.16–1.75 mm) was found compared with sites treated with SCTG only (0.63 mm; range: 0.28–1.22 mm).

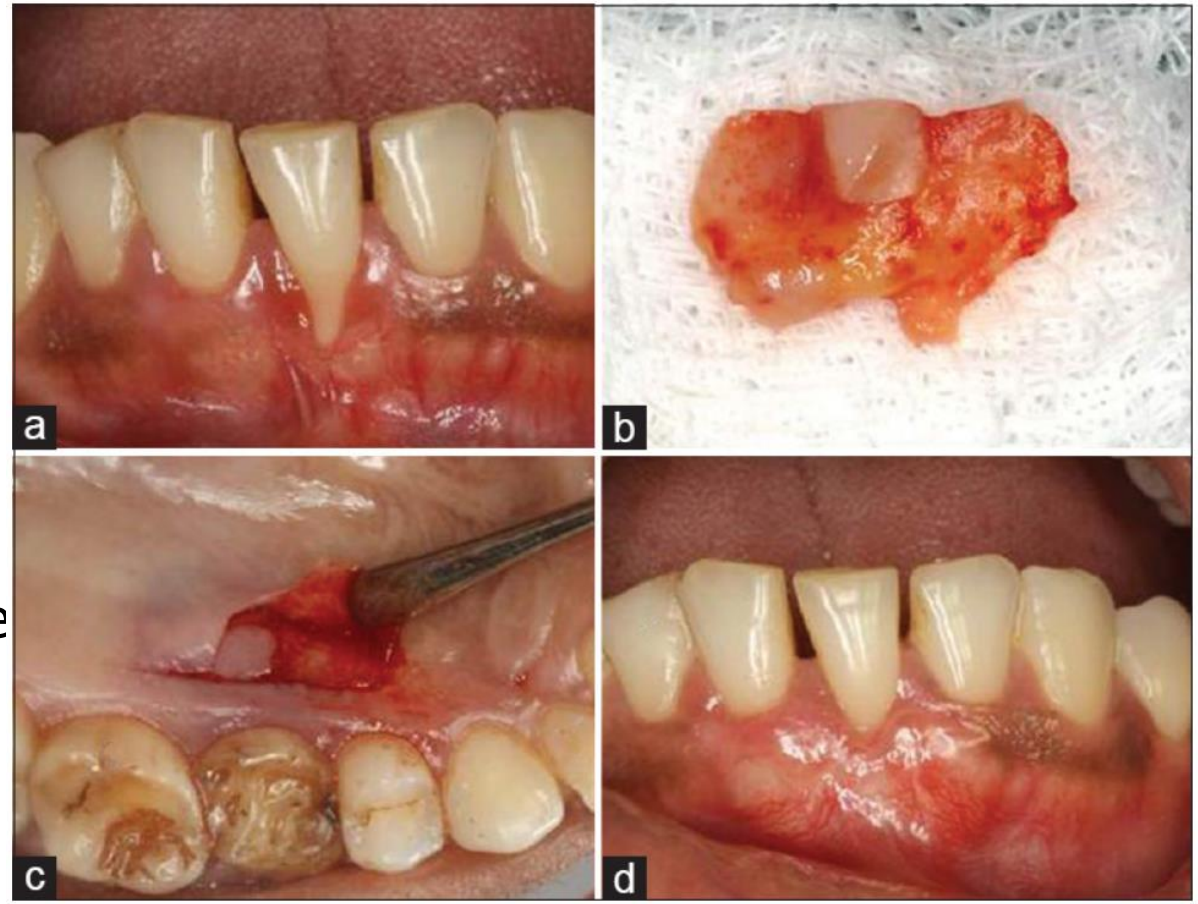


Curvilinear Incision

Inter-positional (inlay) graft procedures

Meltzer,1979

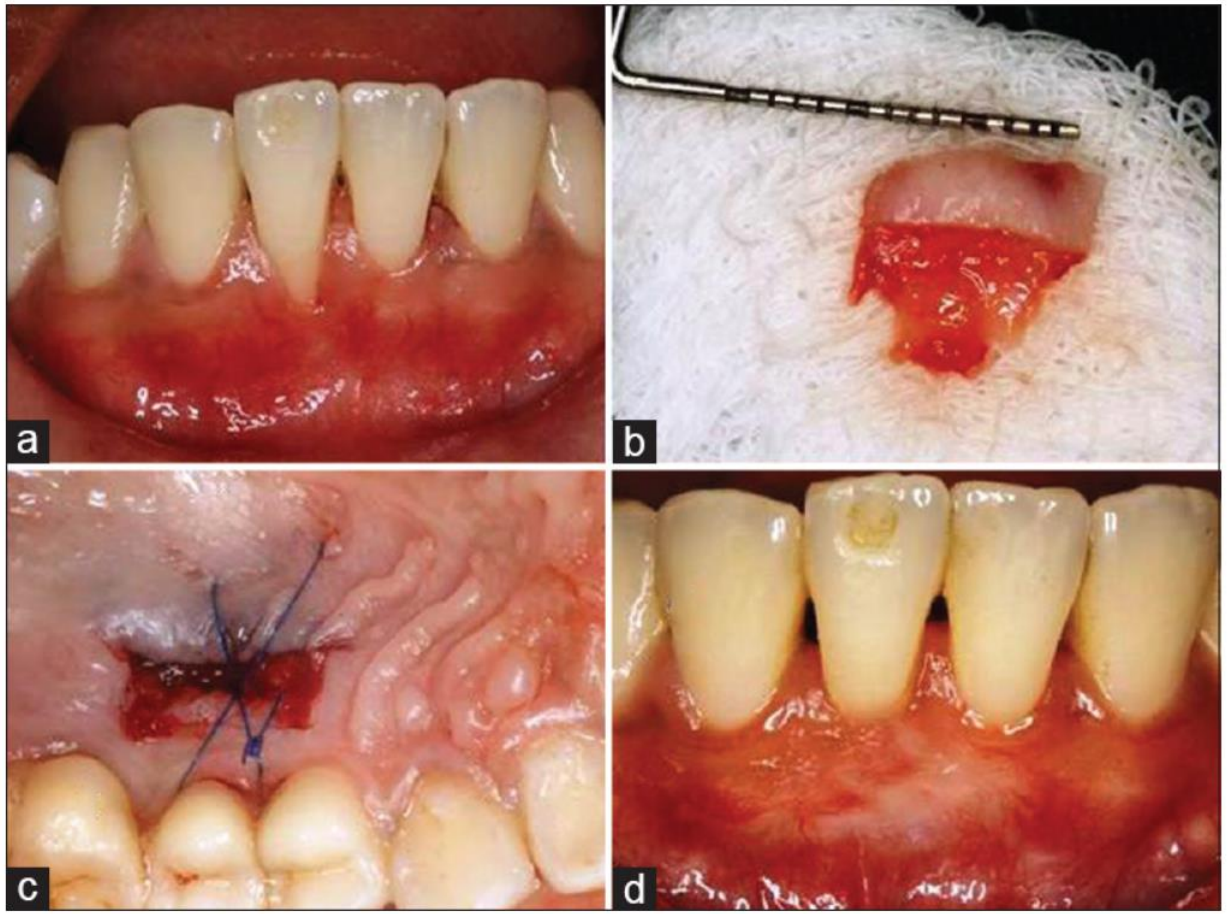
1. A pouch is prepared in the defect area
2. A free graft derived from the palatal or maxillary tuberosity was harvested.
3. The graft obtained was partially de-epithelialized and the exposed connective tissue was inserted in the pouch area like wedge (inlay graft).



Inter-positional (inlay) graft procedures

Meltzer,1979

The epithelialized part of the graft remained outside the pouch and sutured at the level of the epithelial surface of the surrounding tissues



Soft tissue wound **healing** around dental implant

The formation of the biological width and maturation of the barrier function around transmucosal implants requires 6-8 weeks of healing.

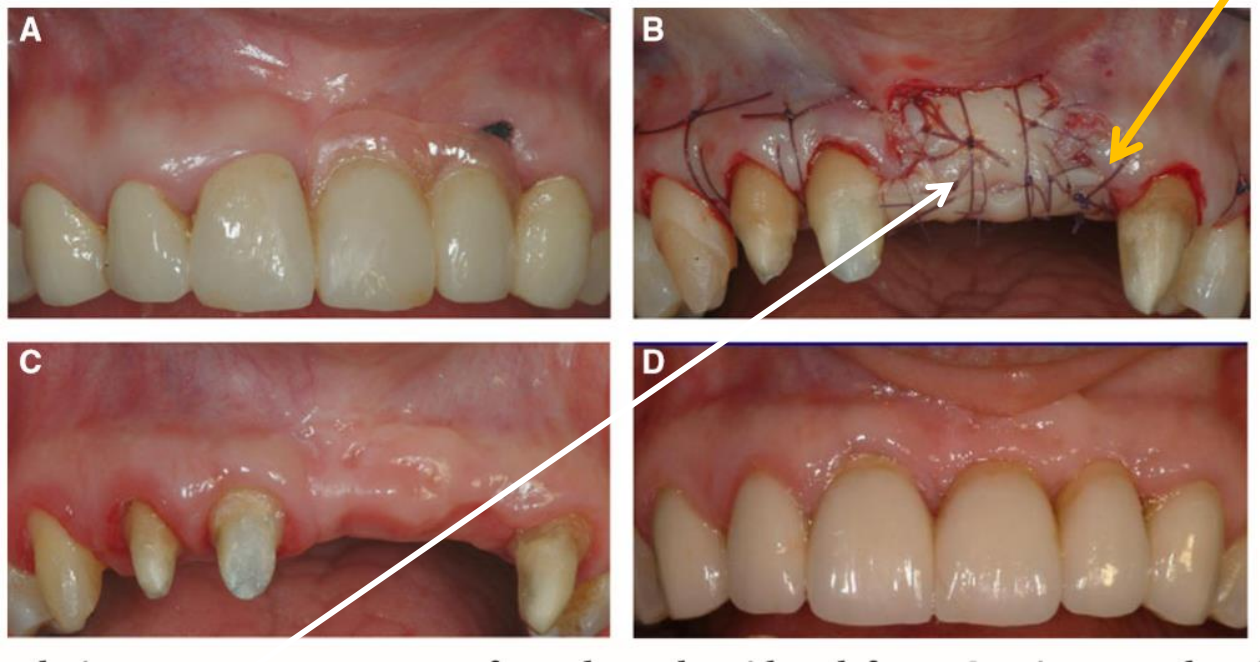
Epithelialized Palatal Graft Technique *(Atkins and Sullivan,1968)*

Onlay graft procedures *(Seibert in 1983)*

- The amount of augmentation depending on the thickness of the graft
- shrinkage of the tissue grafted is variable, volume lost during the healing phase may require to repeat the surgical procedure at 2- to 3-month intervals in order to reach the desired ridge height
- Facial color change☹/Correction

To improve the soft tissue texture and reduce scars in the facial aspect of an implant, a **mucosal peeling** may be performed by using a surgical blade, conventional or ceramic burs or a high frequency laser.

A recipient bed is prepared split-thickness incisions in the edentulous area to expose the underlying connective tissue



A free gingival graft is then harvested from the palate and secured on the recipient vascular bed with interrupted and compressive sutures

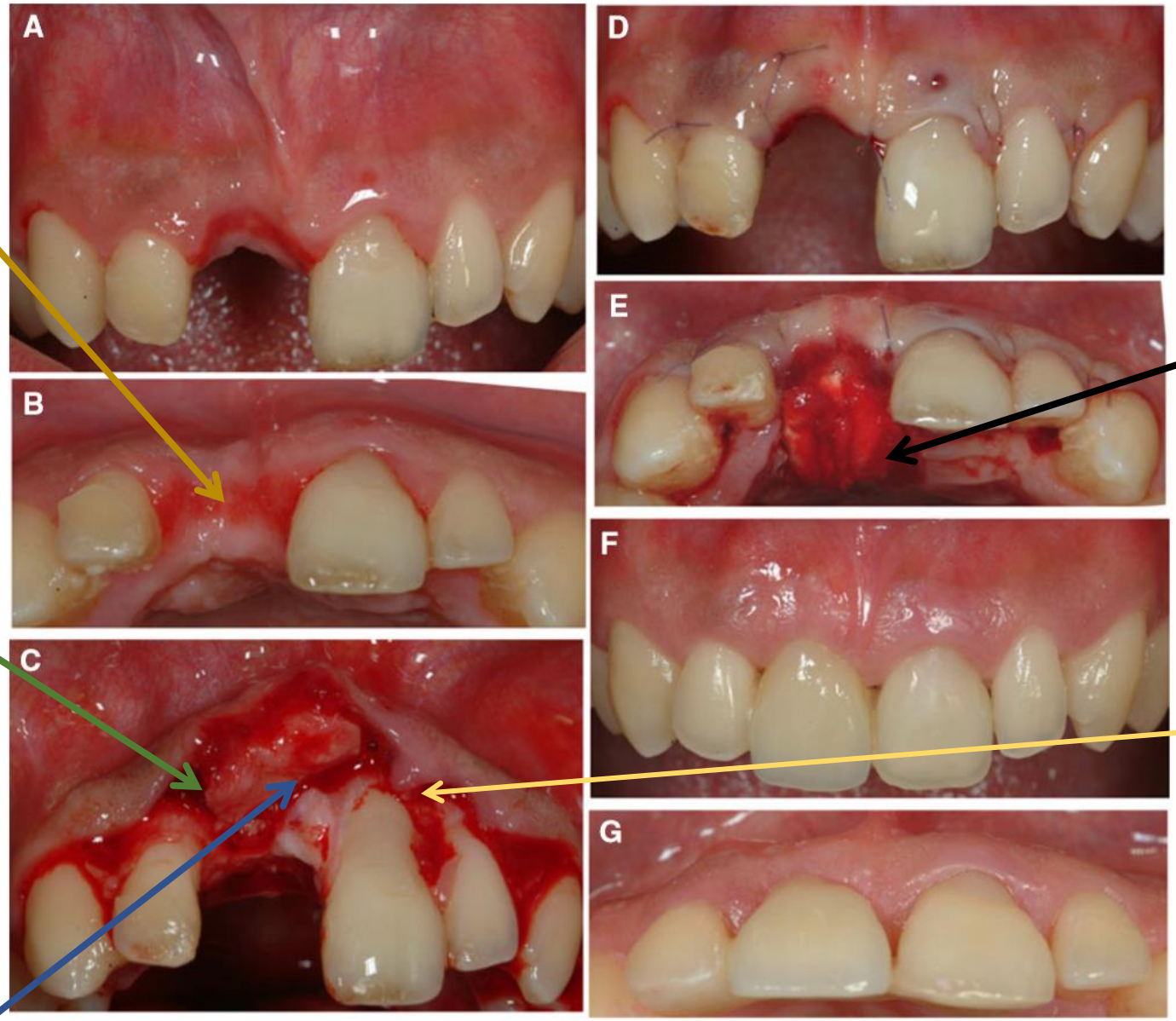
Roll flap technique

Abrams , 1980

a connective tissue pedicle flap that originates from the **de-epithelialization of the palatal tissue** close to the edentulous area

Two parallel incisions are made from the occlusal edentulous area toward the palate and connected with a horizontal incision.

A split-thickness palatal flap is then elevated.

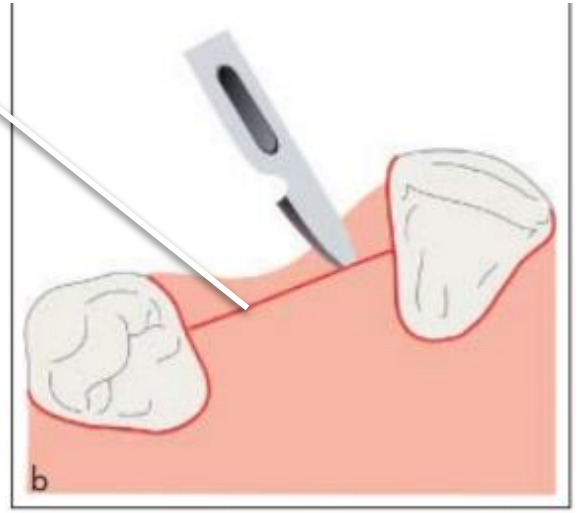


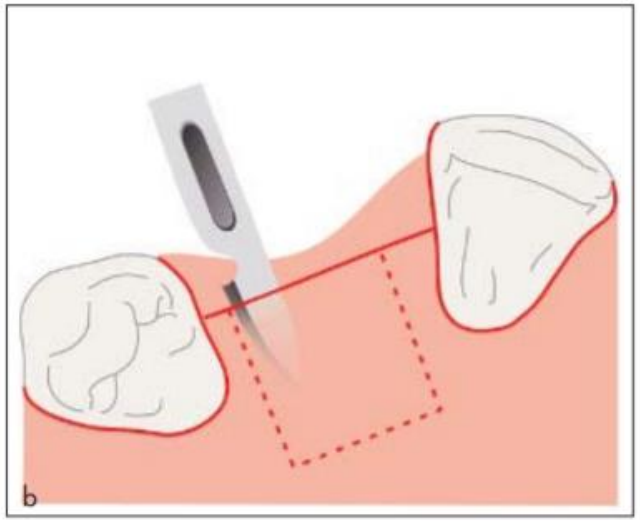
The palatal flap is ‘rolled’ into the pouch area and then sutured In place

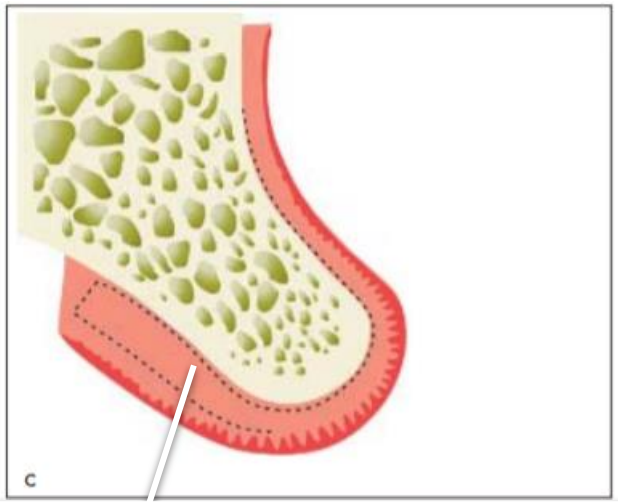
defect area a **pouch is prepared** with a split dissection of the supraperiosteal connective tissue

Modified roll technique

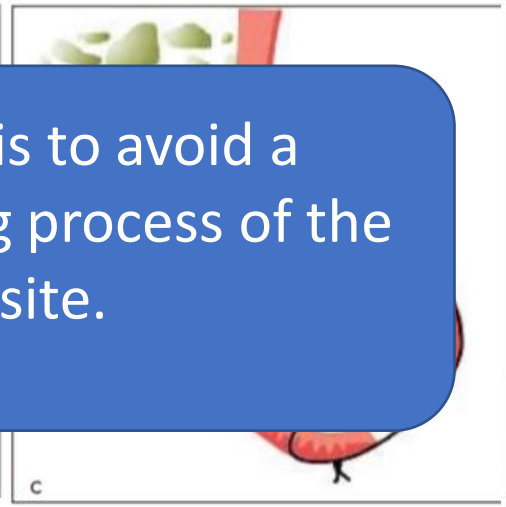
a palatal split-thickness flap is elevated without any de-epithelialization



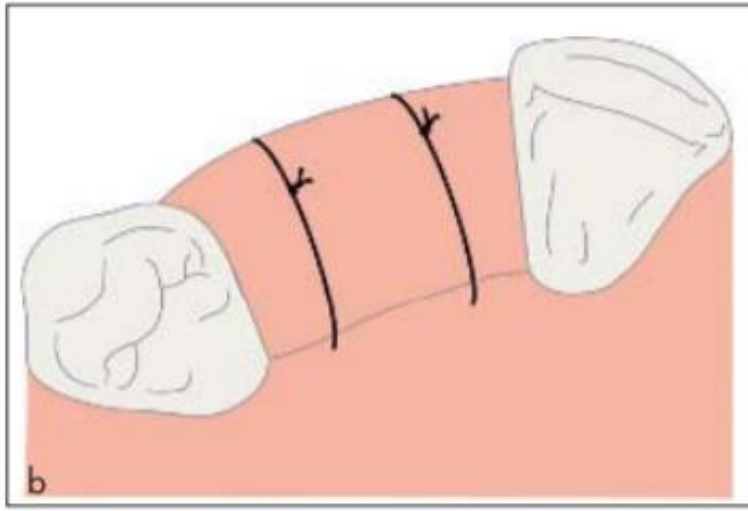




The connective tissue that 'rolls' in the donor area is formed of the palatal underlying submucosa and the palatal periosteum.



The rationale is to avoid a secondary healing process of the donor site.



Combination onlay–inlay grafts

Seibert & Louis , 1996

- Simultaneous tissue augmentation in the horizontal and vertical dimensions.
- The donor site was prepared with a full-thickness coronal and a partial thickness apical dissection connective tissue only





Combination onlay–inlay grafts

Seibert & Louis , 1996

- The onlay section (epithelialized area) of the graft is sutured on the crestal surface of the defect, while the inlay section (connective tissue) is inserted and secured in the vestibular pouch area.

Fig 8 *Subepithelial connective tissue portion inserted labially and secured with horizontal mattress suturing.*

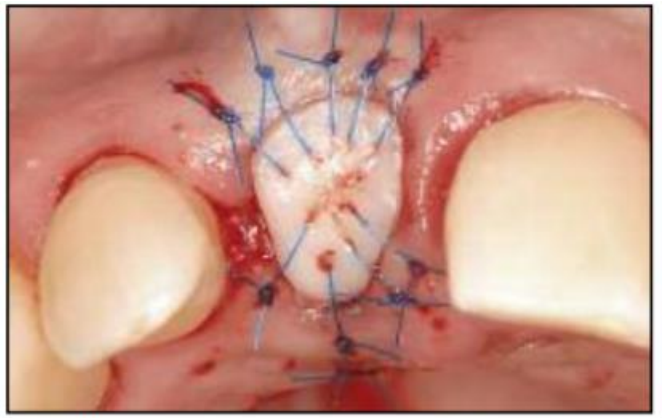
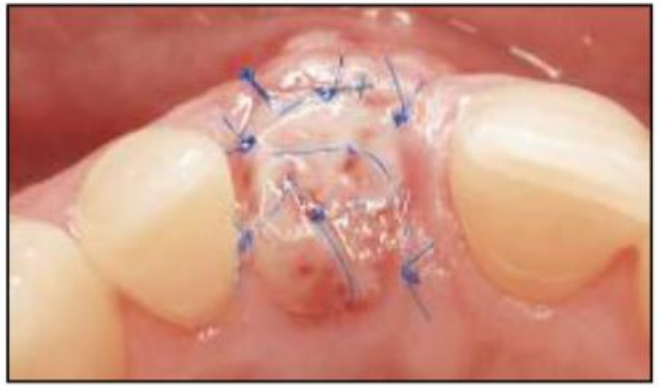


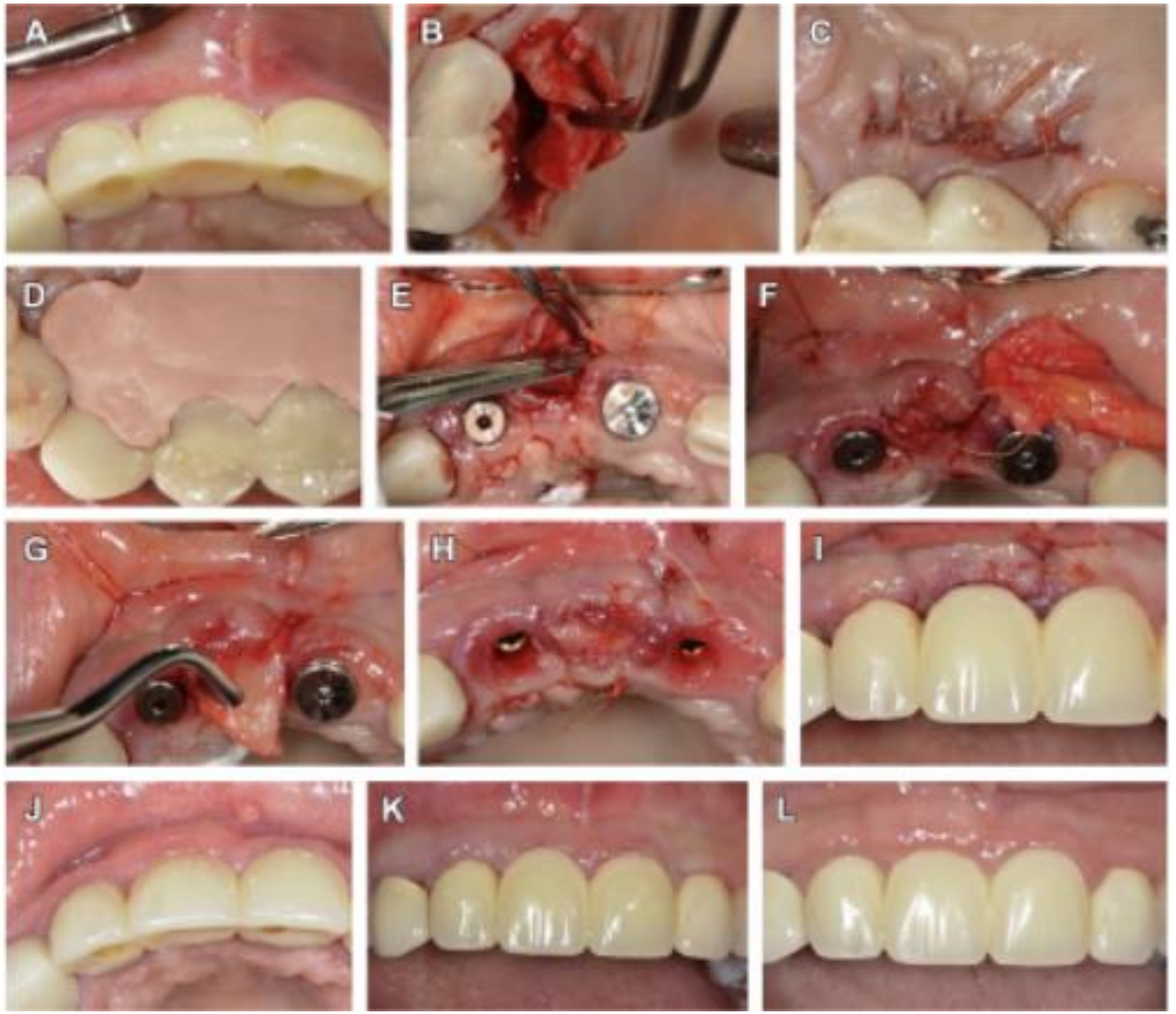
Fig 9 *Wound margins were adapted with single sutures to stabilize the graft.*

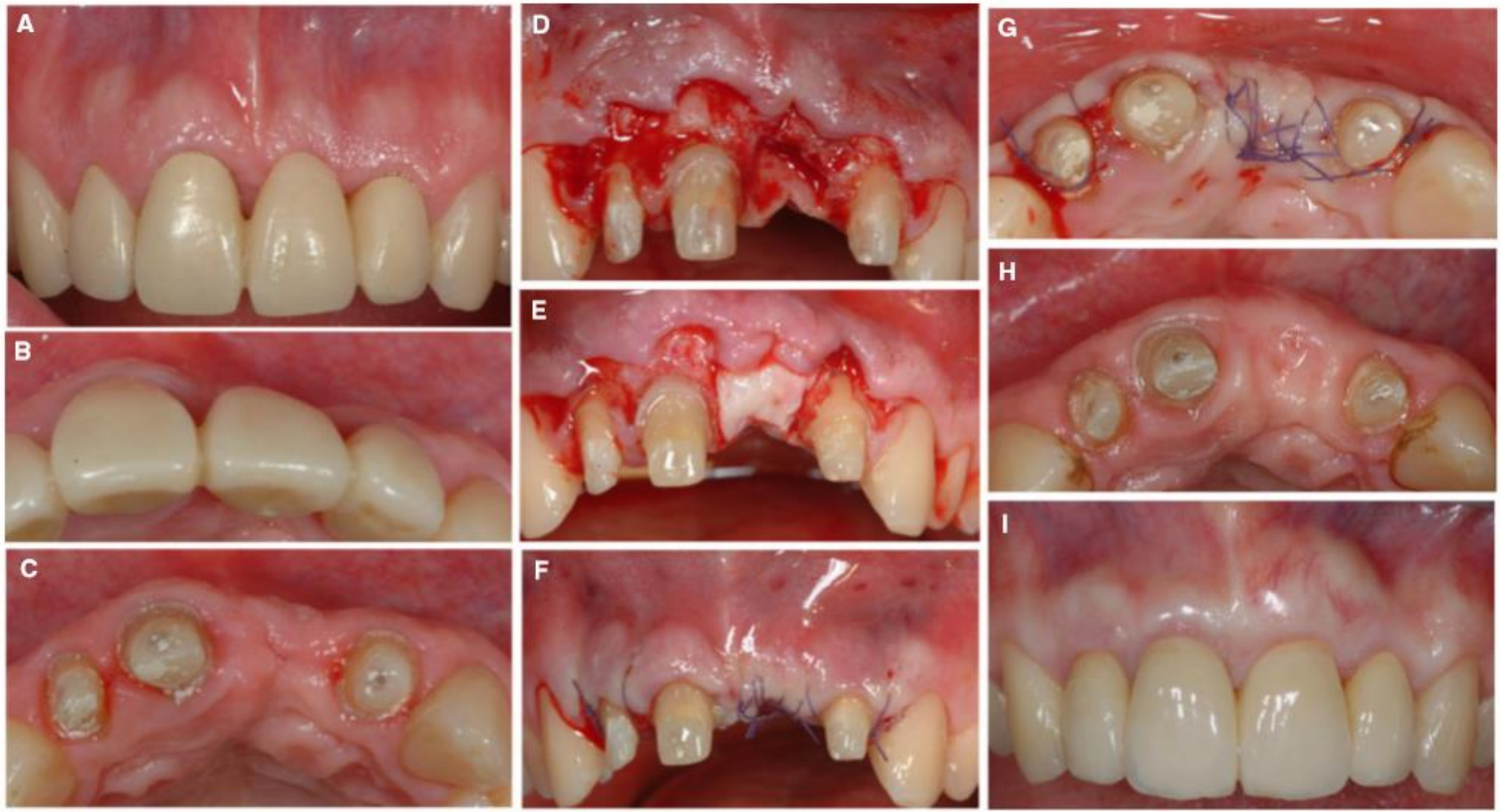


Pouch procedures and connective tissue grafts

1. In the defect area a pouch is prepared with a split dissection of the supraperiosteal connective tissue
2. SCTG is sutured to the periosteum.
3. The flap is sutured in its original position and covers the connective tissue graft completely.

- The main advantage of pouch techniques is that they maintain the color and surface characteristics of the existing tissues,

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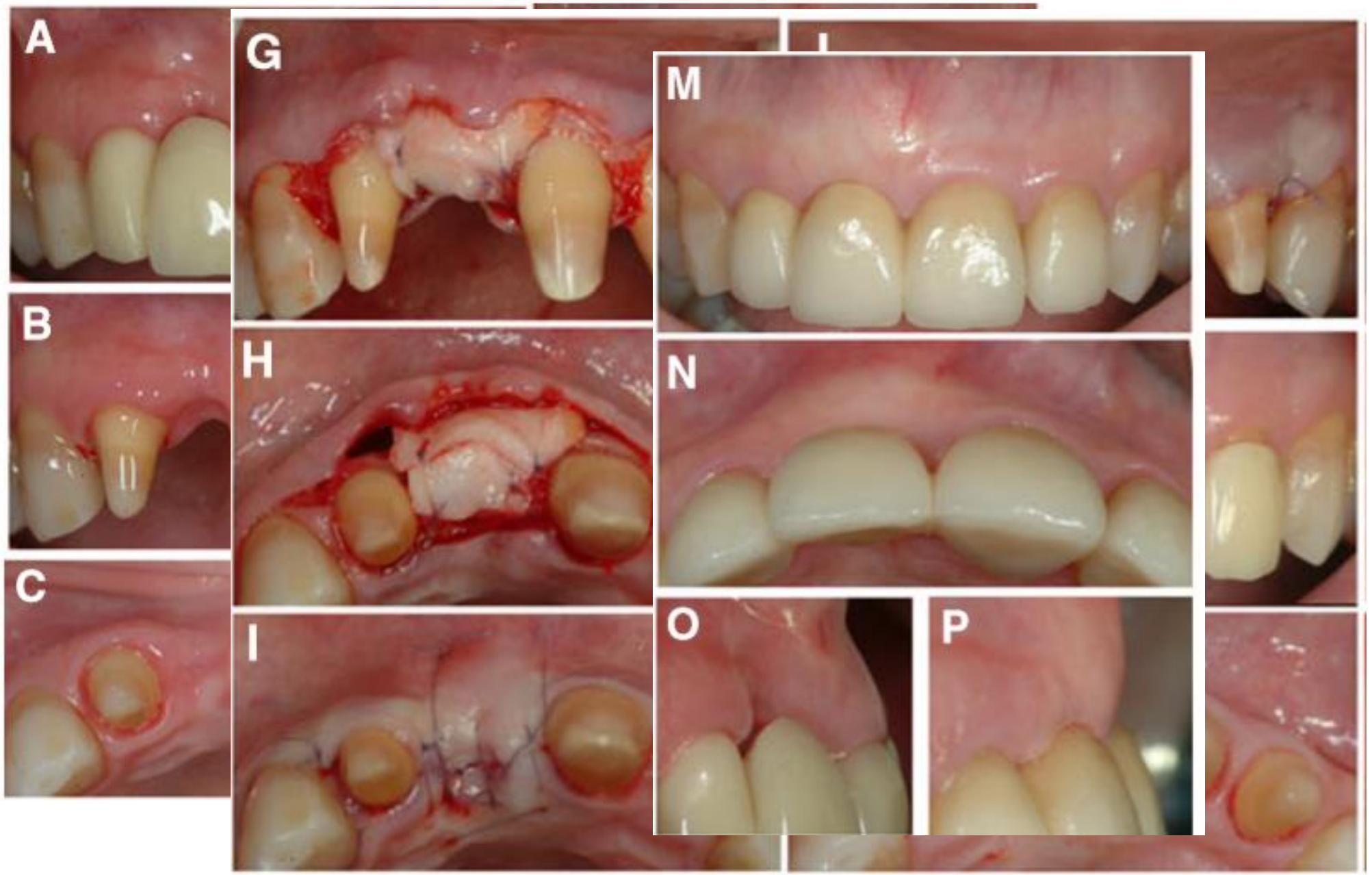
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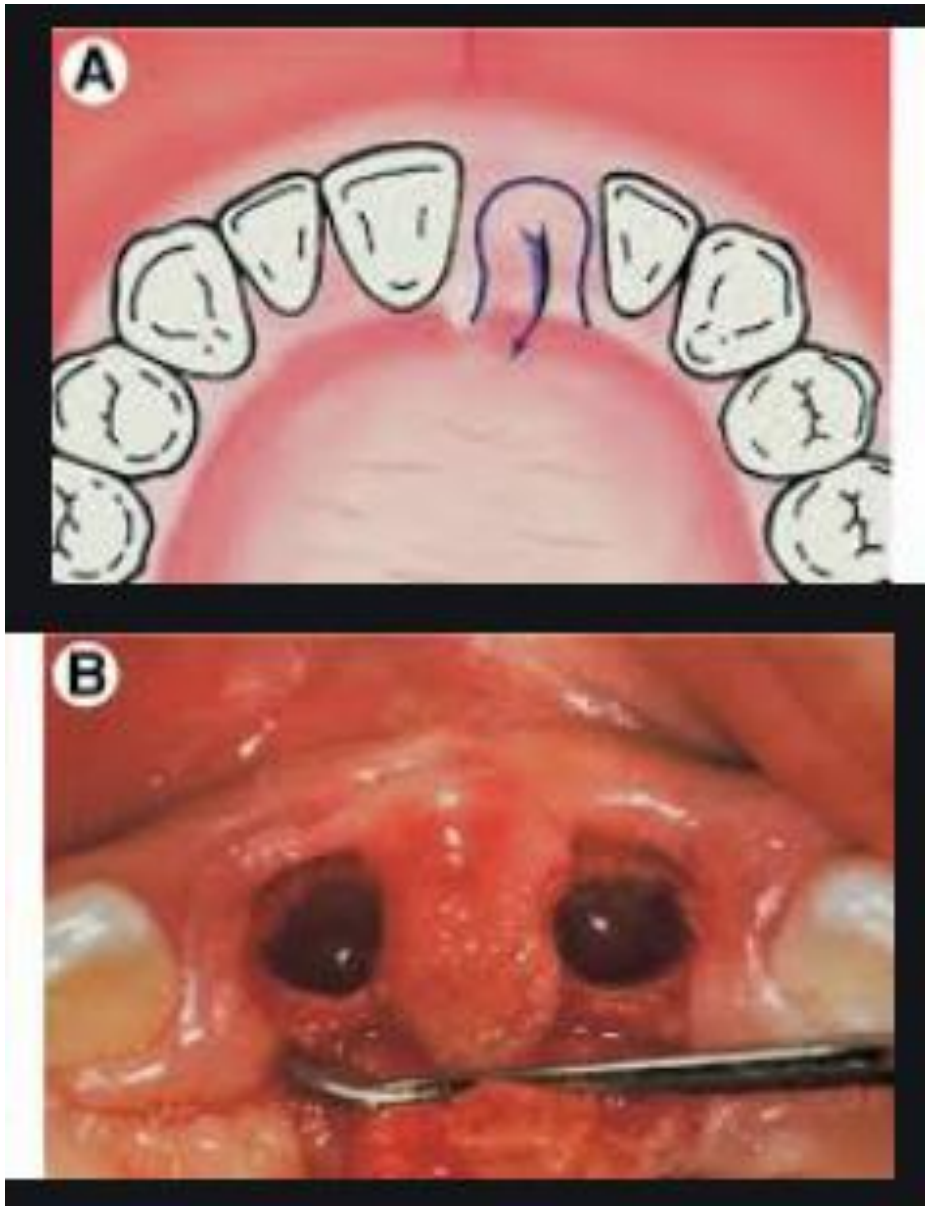
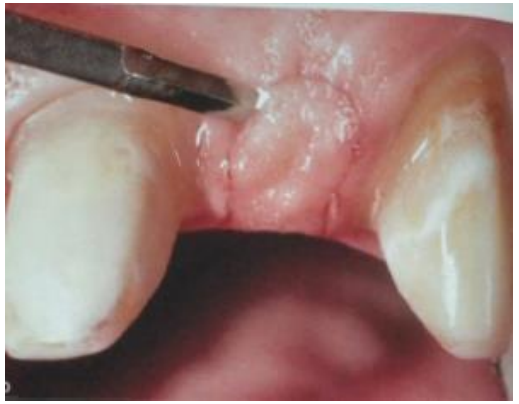
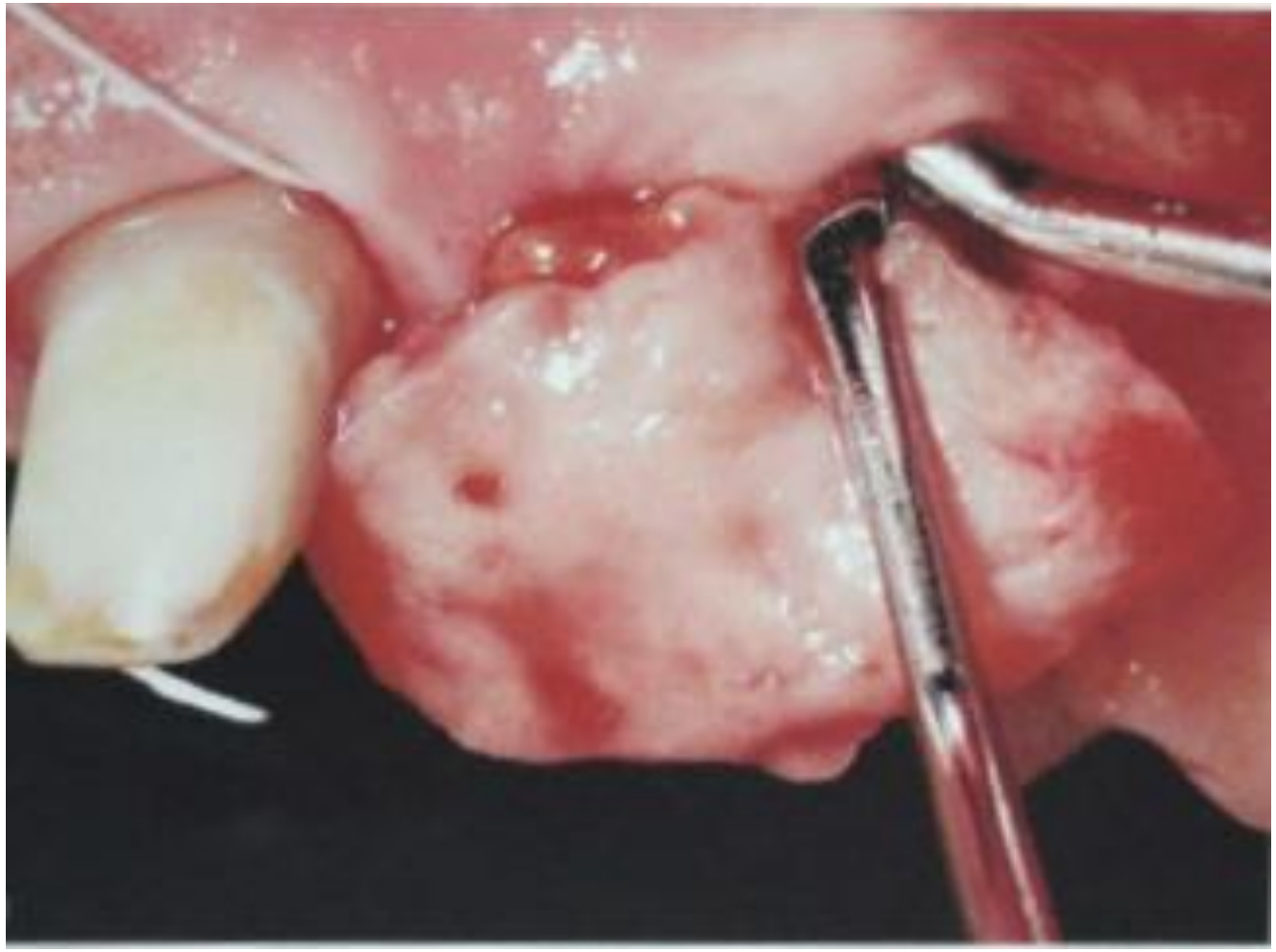
Palatal or lingual based U-shaped peninsula flap

- For access to an esthetic implant site.
- Visualization of the buccal aspect of the alveolar ridge for tissue augmentation is unnecessary.
- Avoided to minimize scarring
- Avoid soft tissue recession at the site by preserving circulation and soft tissue volume.

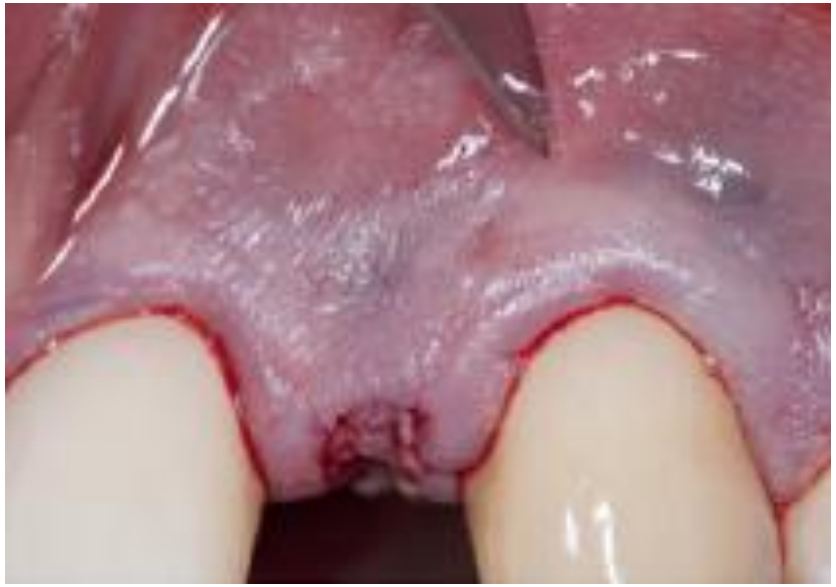


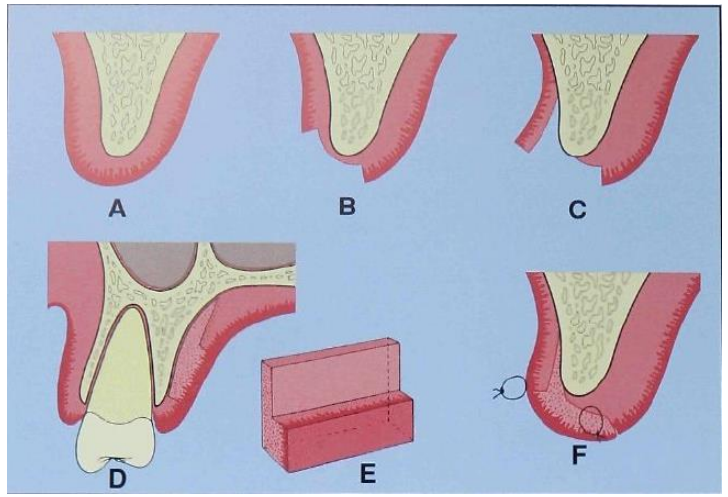


Pouch technique



Modified pouch technique

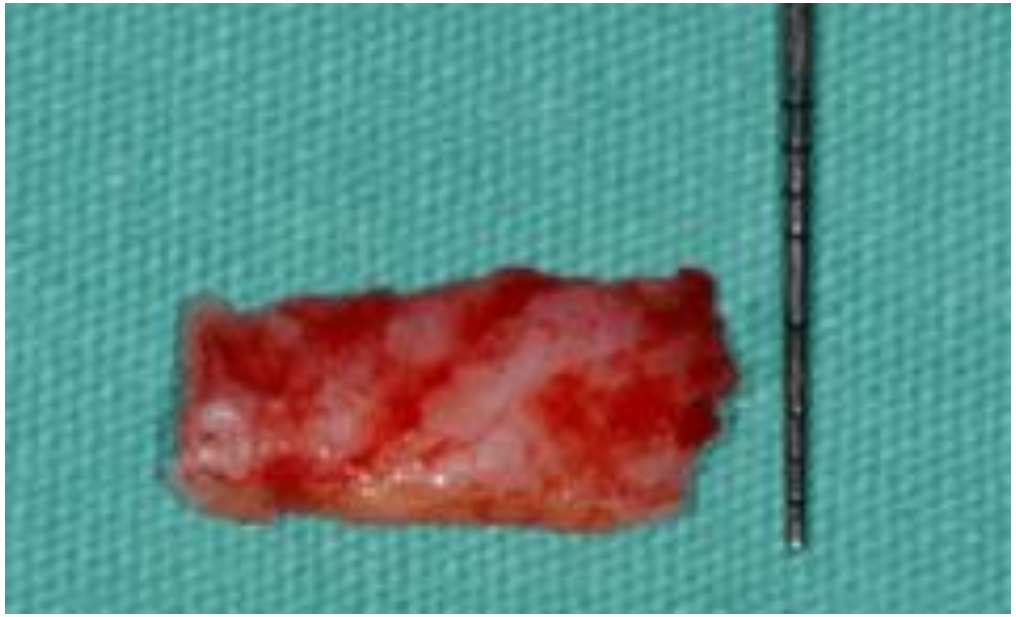


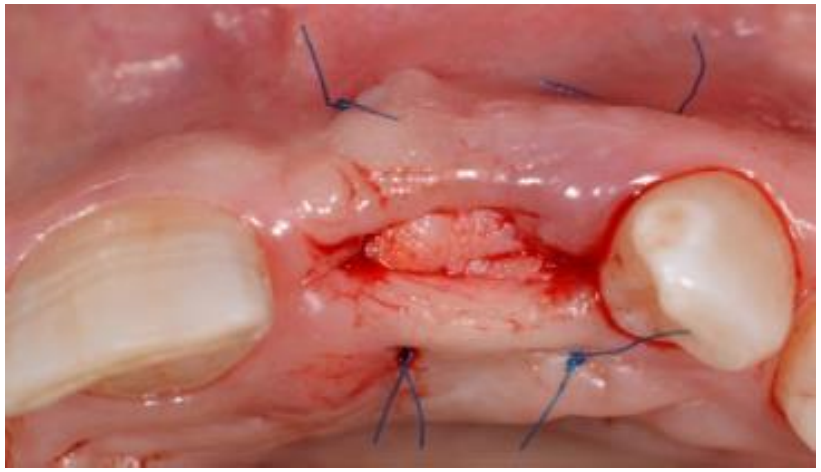


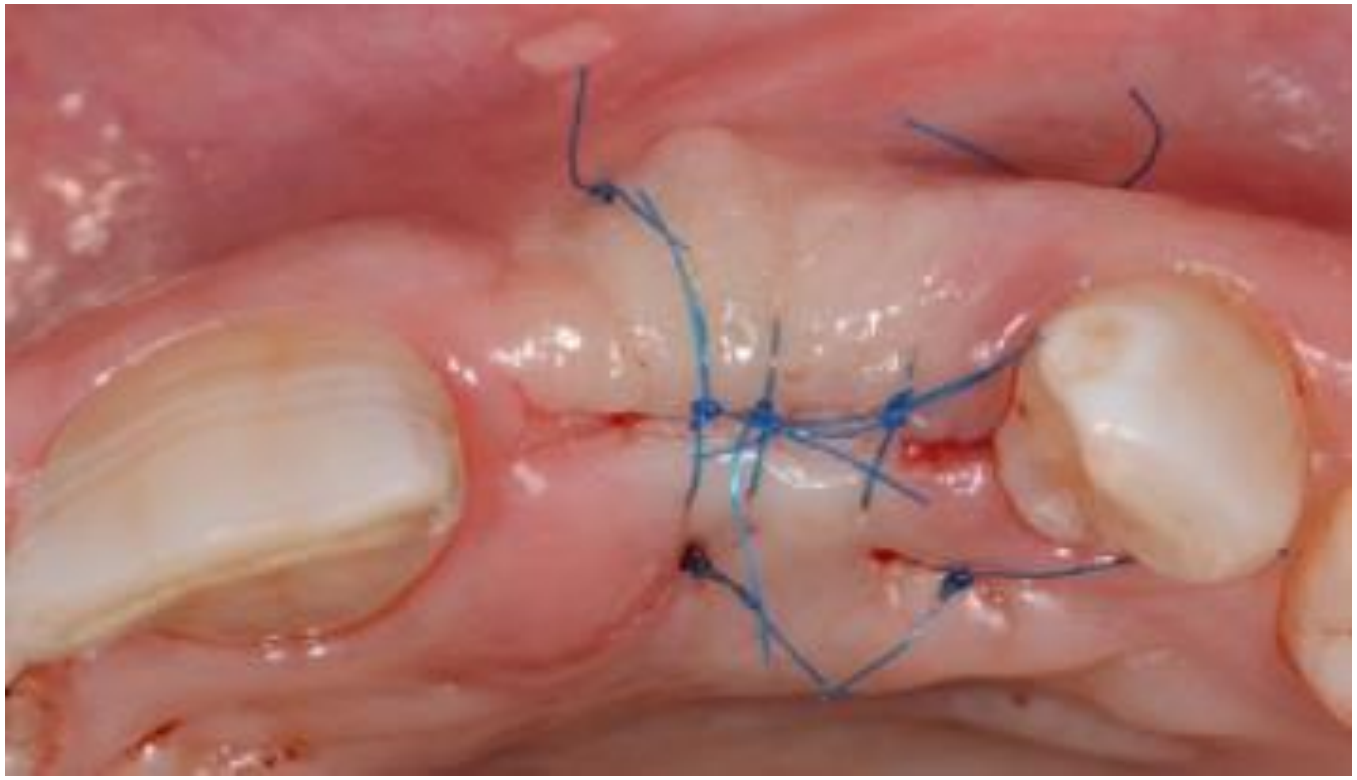
Soft Tissue Ridge Augmentation Utilizing a Combination Onlay–Interpositional Graft Procedure: A Case Report

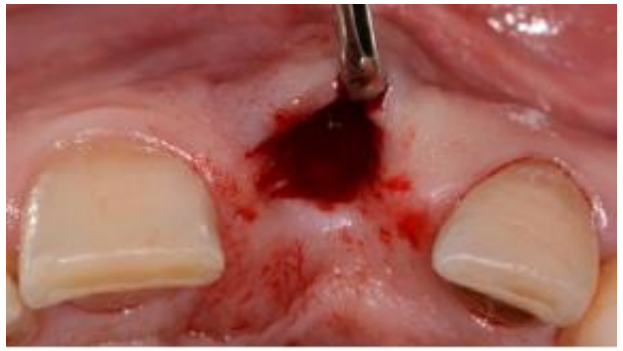
*Jay S. Seibert, DDS, MScD**
*John V. Louis, DMD***

Combined on lay interpositional grafting

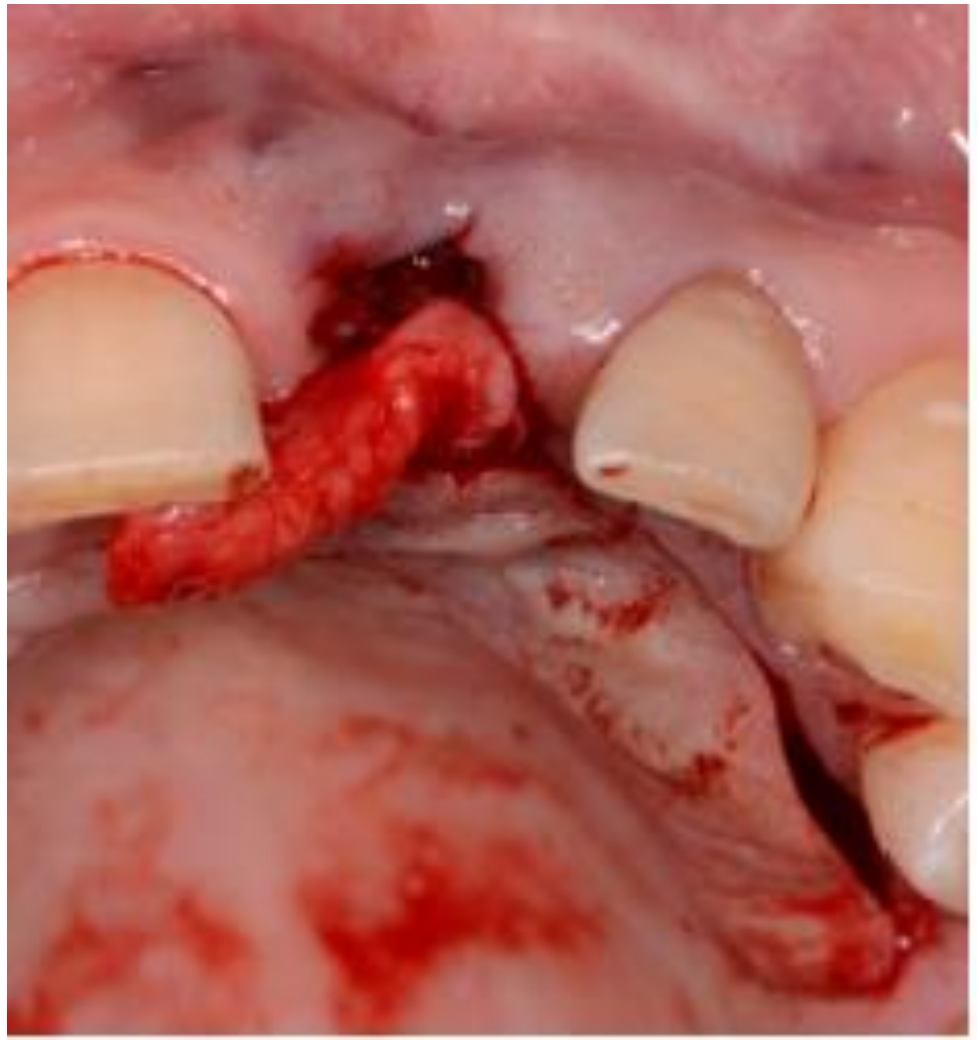


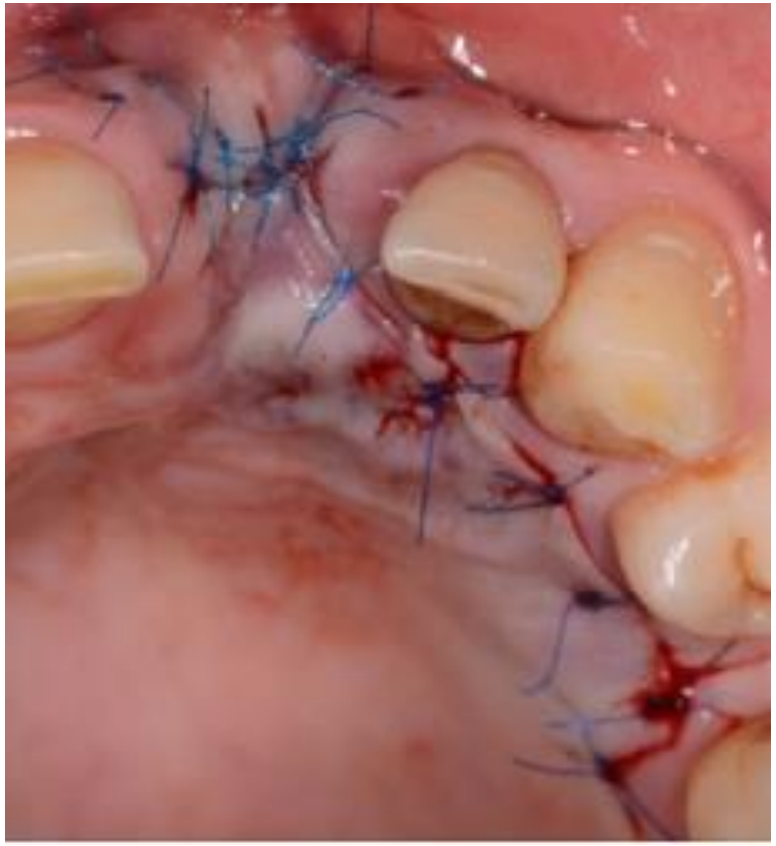


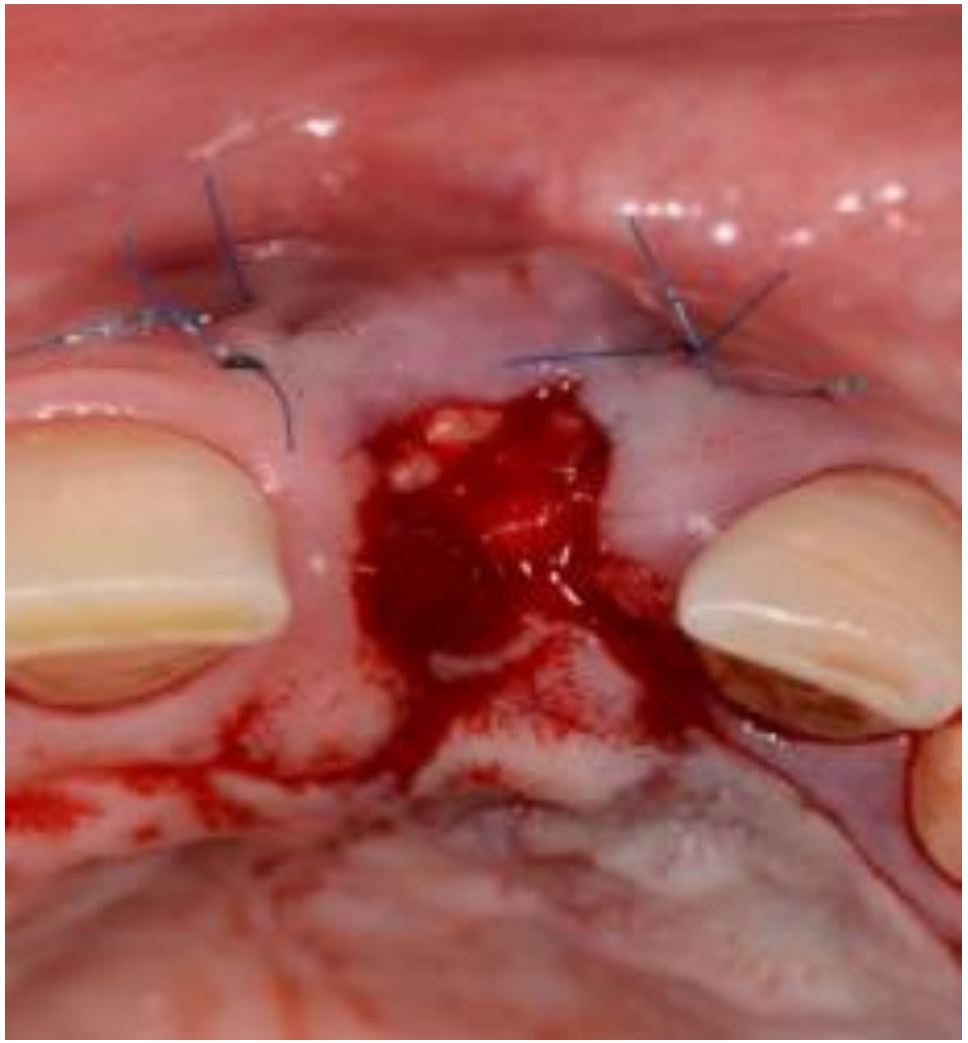




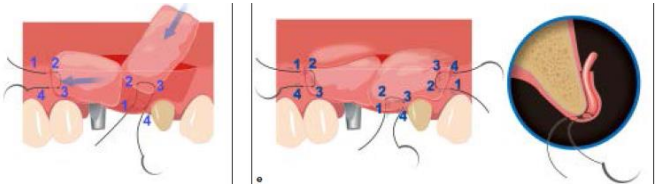
Test group

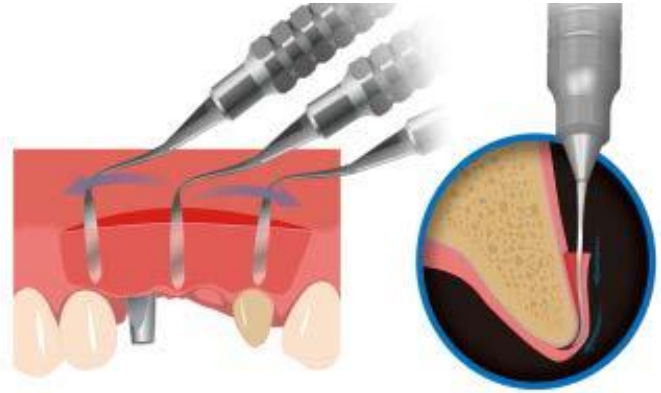


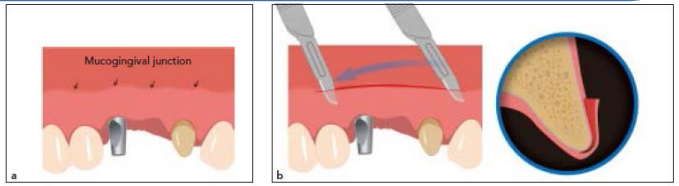




Apical pouch technique with autogenous CTGs can be used for the correction of marginal tissue recession around dental implants and natural teeth, as well as the augmentation of soft tissue volume around an alveolar ridge defect, which allows for molding of papillae and buccal convexity in the esthetic zone.

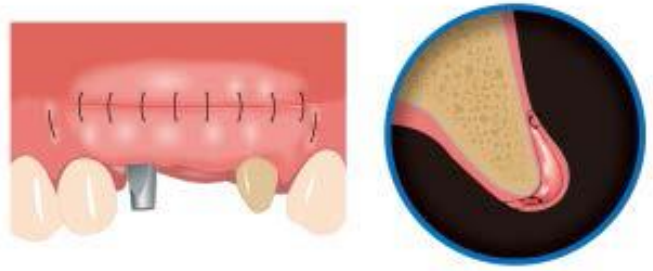






Soft Tissue Volume Augmentation Using Connective Tissue Grafts via Apical Pouch: Technical Considerations and Case Reports

The APT optimizes successful esthetics because of its ability to provide bilaminar vascular supply, which favors graft survival and helps attain tension-free primary wound closure.



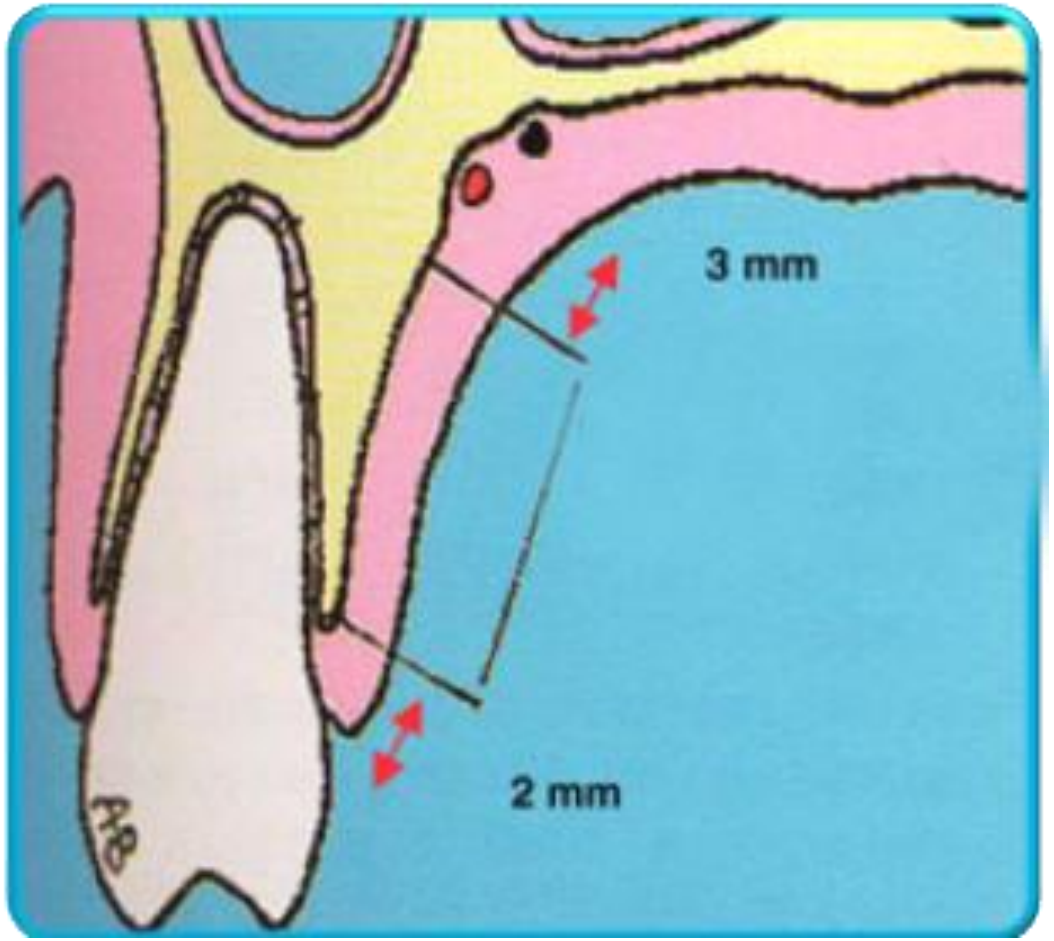
Donor Site

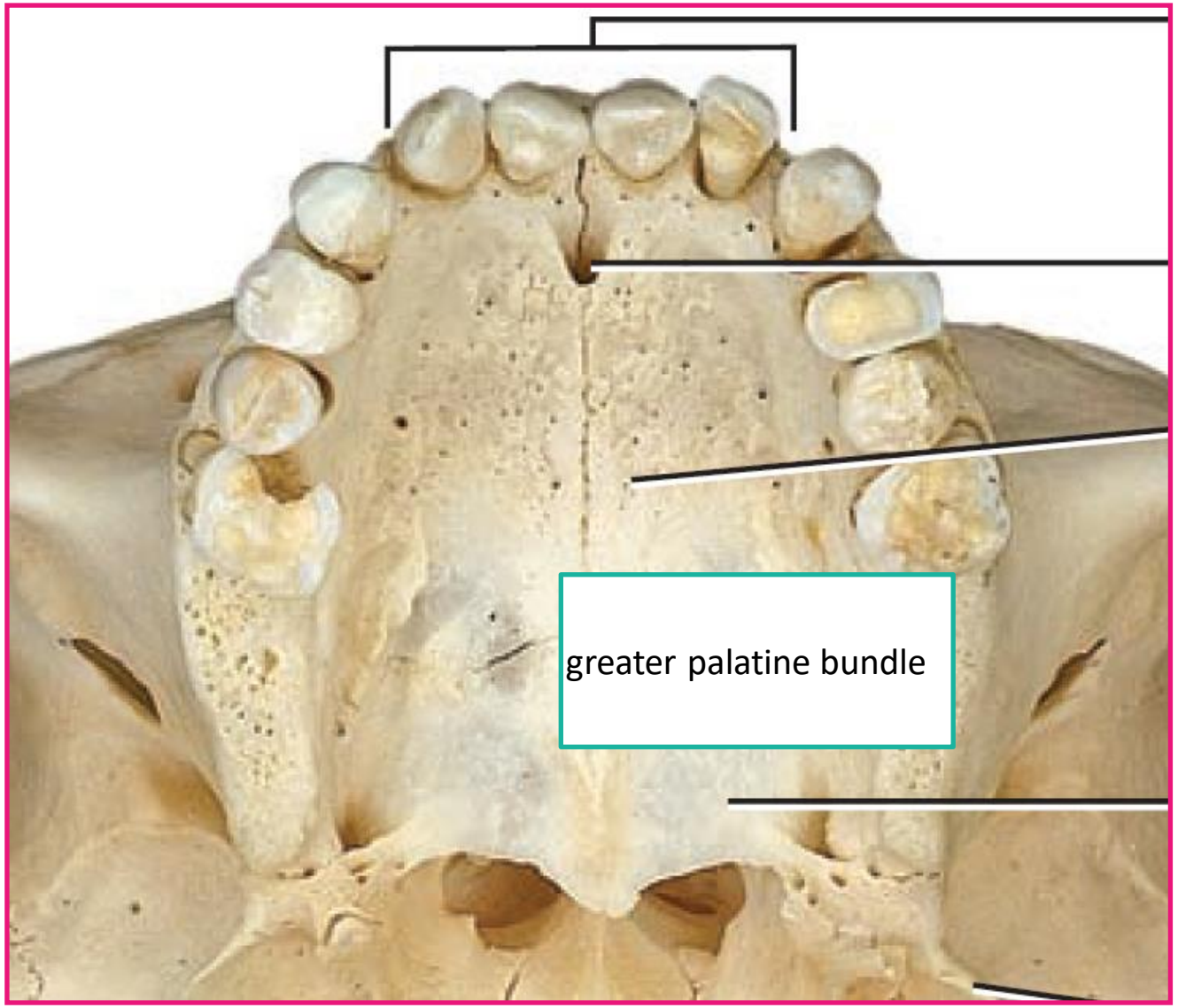
The Palate is the donor site for surgical procedures.

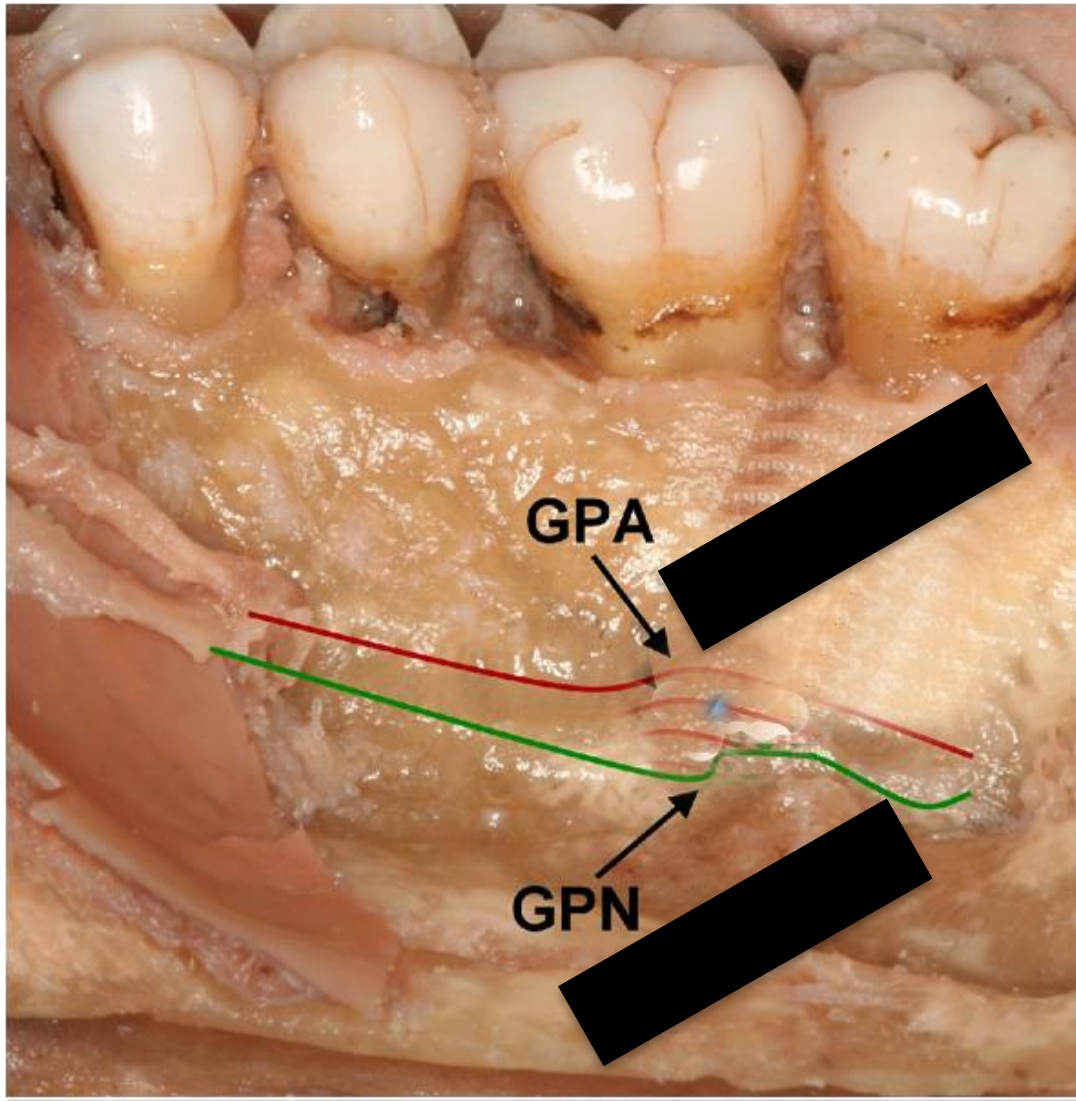
The surgical anatomy is essential to reduce risk of injury

Surgical anatomy

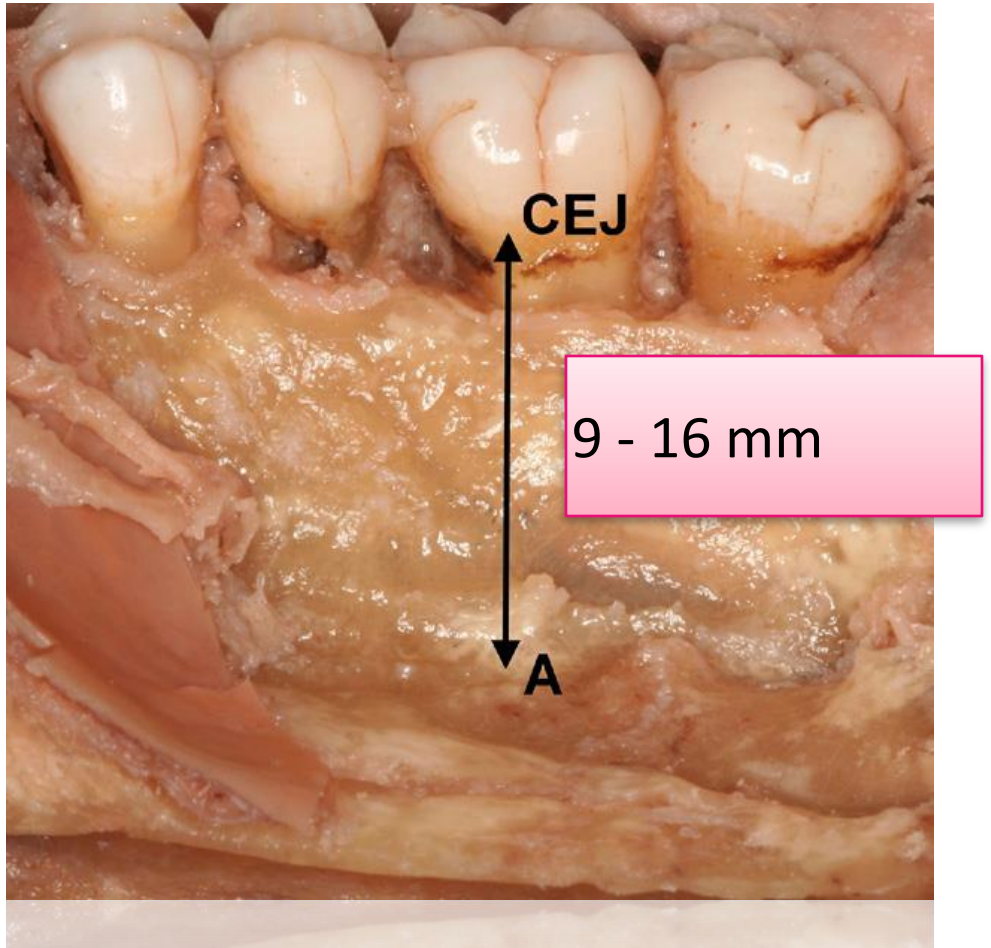
How safe is it to harvest from the palate ?



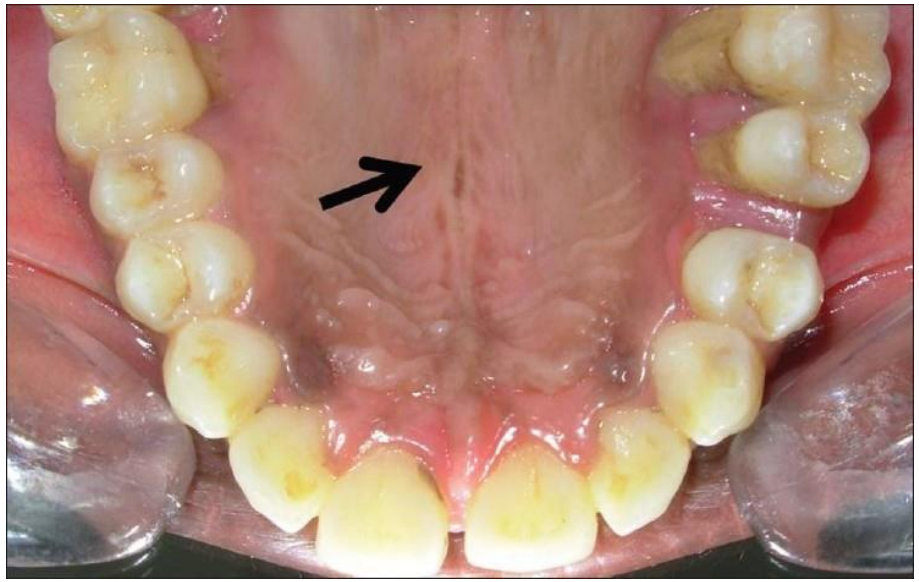

greater palatine bundle

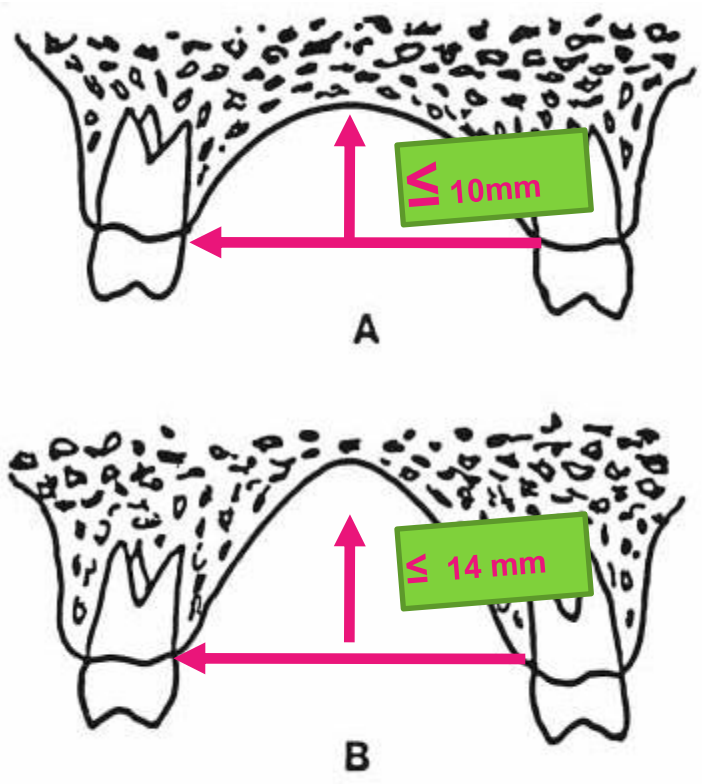

GPA
GPN

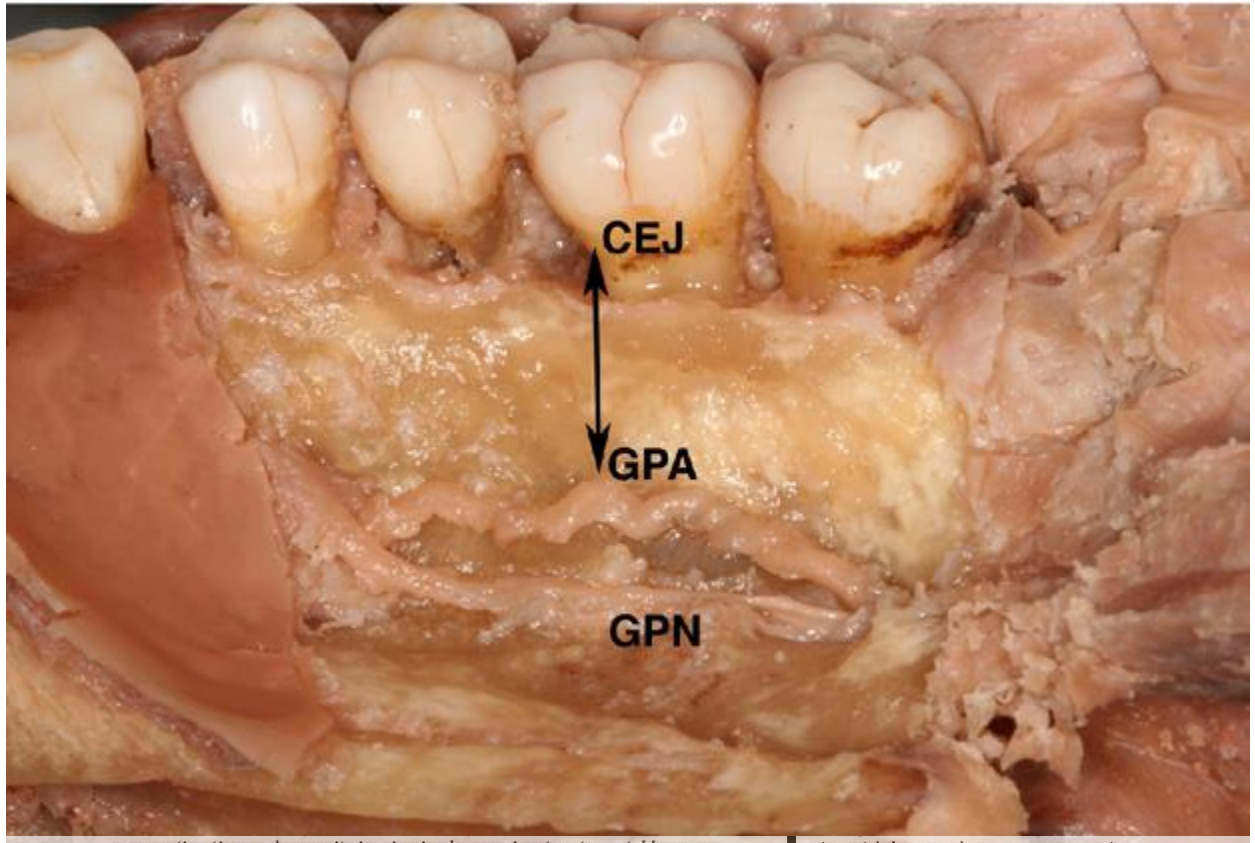
Distance from CEJ to GPA



Palatal Vault





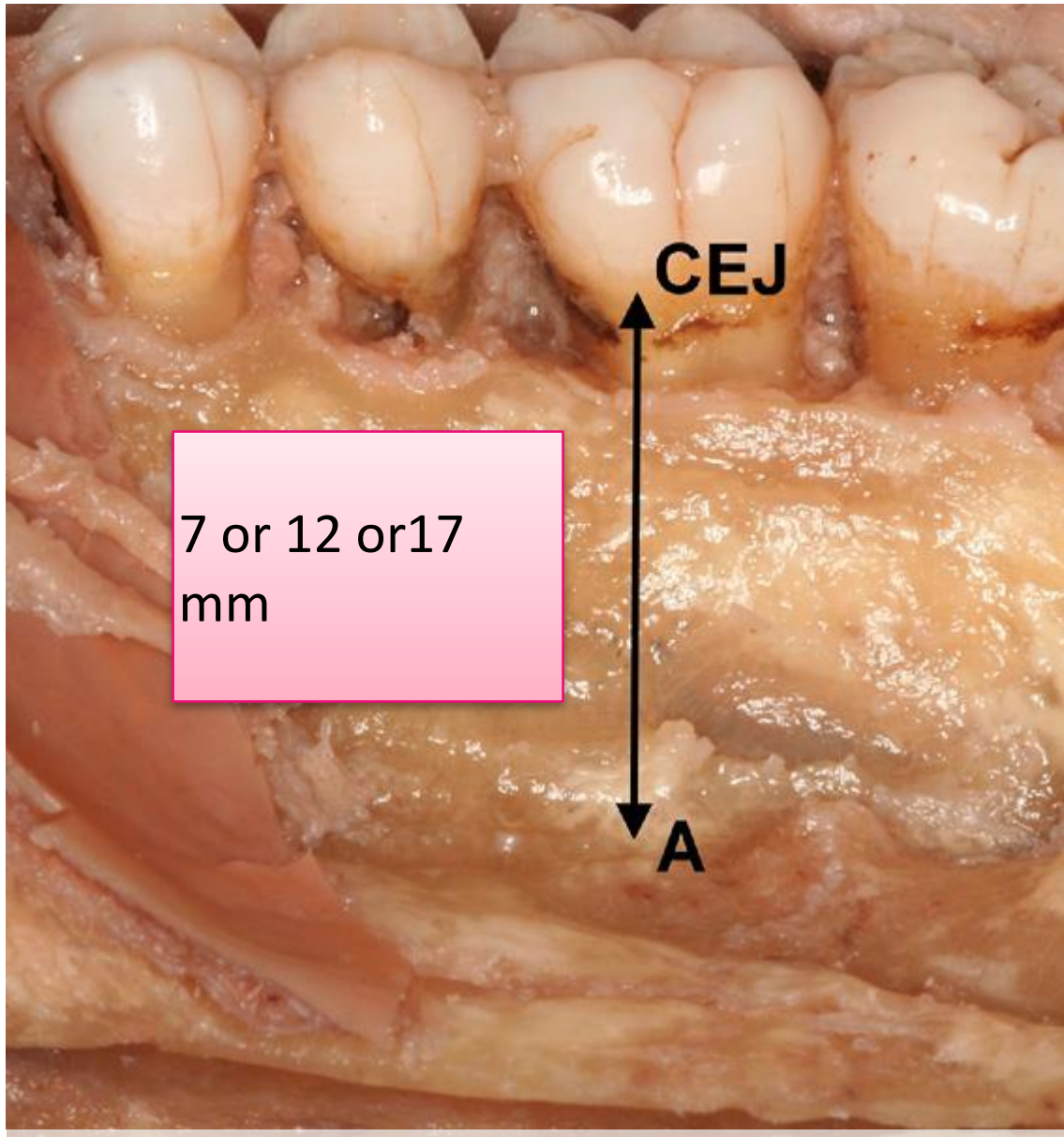


connective tissue donor site in gingival recession treatment. However, concern has been raised regarding the potential risk of damaging the greater palatine artery (GPA) due to anatomical variations in the palatal vault. The anatomy of the palatal vault in terms of size and shape may affect the maximum dimensions of the graft that can be safely taken from the palatal vault. In a cohort of patients free of periodontal disease, the purpose of this study was to assess the maximum dimensions of the graft, particularly the height and length, that could be safely taken from the palatal vault.

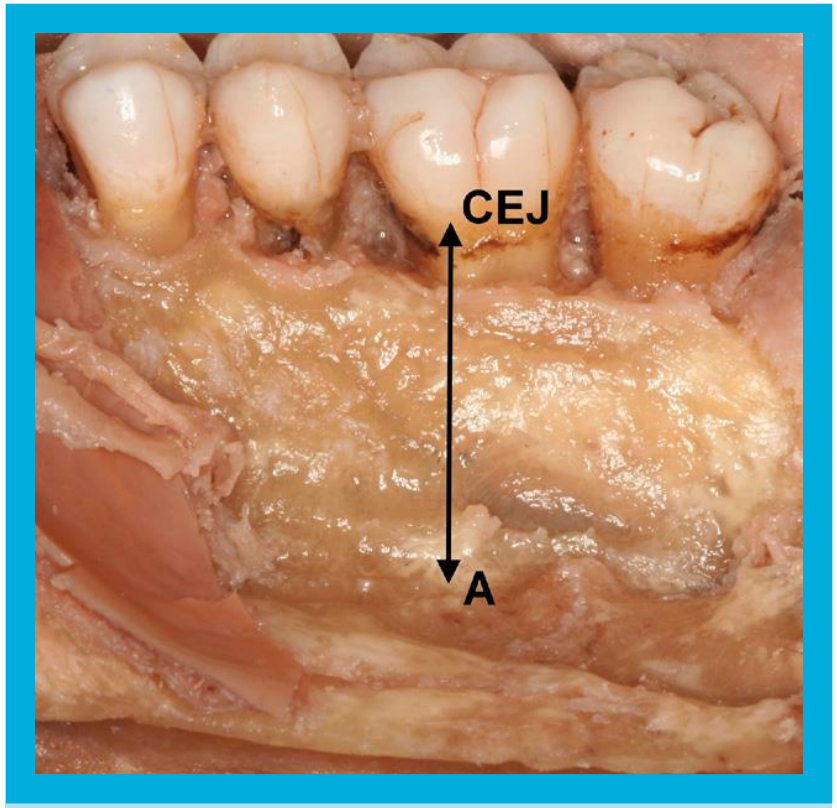
Methods: *Plaster impressions were made from 198 patients free of periodontal disease. Because the connective tissue graft is usually taken from an area extending from the mid-palatal aspect of the canine to the mid-palatal aspect of the second molar, this interval was measured and represented the maximum length dimension. The emergence of the GPA was assumed to be localized at the junction of the vertical and horizontal palatal walls of vault, and its course was marked on the plaster casts. The maximum height of the graft corresponded to the distances measured from the gingival margin to the marked course of the GPA of each tooth at its interproximal and mid-palatal aspects.*

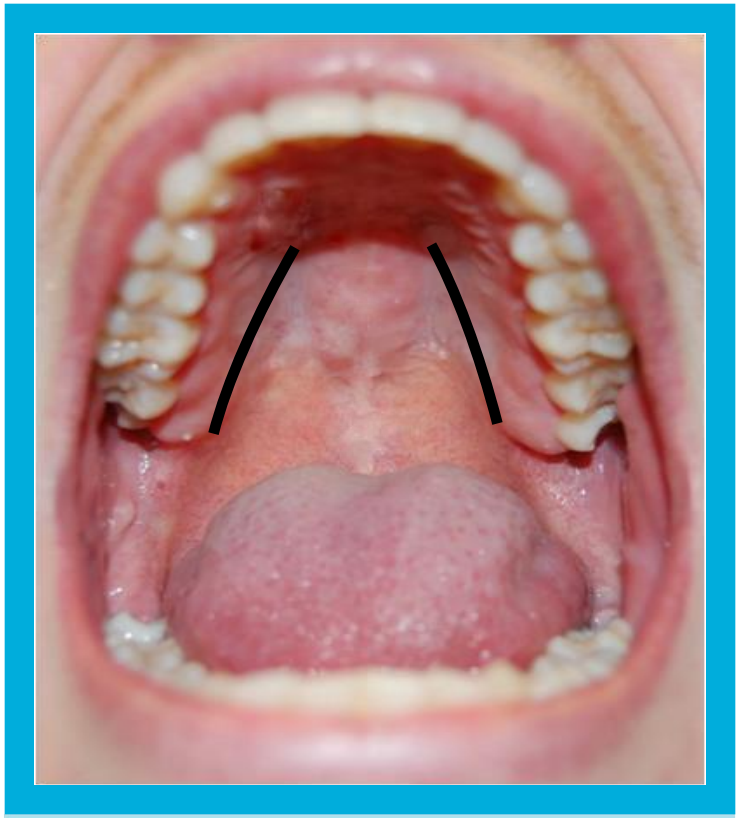
Results: *The length of the maximum available tissue graft was*

is widely used as a connective tissue donor site in periodontal plastic surgery and particularly in gingival recession treatment, with reported high success rates.[1-5] However, concern has been raised regarding the potential risk of damaging the greater palatine artery (GPA) due to variation in the anatomy of the palatal vault. Reiser et al.[6] suggested that variation in terms of size and shape of the palatal vault may affect the dimensions of the donor tissue harvested. Therefore, it was of interest to study the maximum dimensions that can be taken from the palatal vault in terms of height and length in relation to the usual course of the greater palatine artery in an unselected population of patients free of periodontal disease.



The greater palatine bundle is usually located at the junction of the horizontal and vertical bony plates of the hard palate





Mucosal Thickness

Palatal root of the first molar represented an anatomic barrier

The Accuracy of Identifying the Greater Palatine Neurovascular Bundle: A Cadaver Study

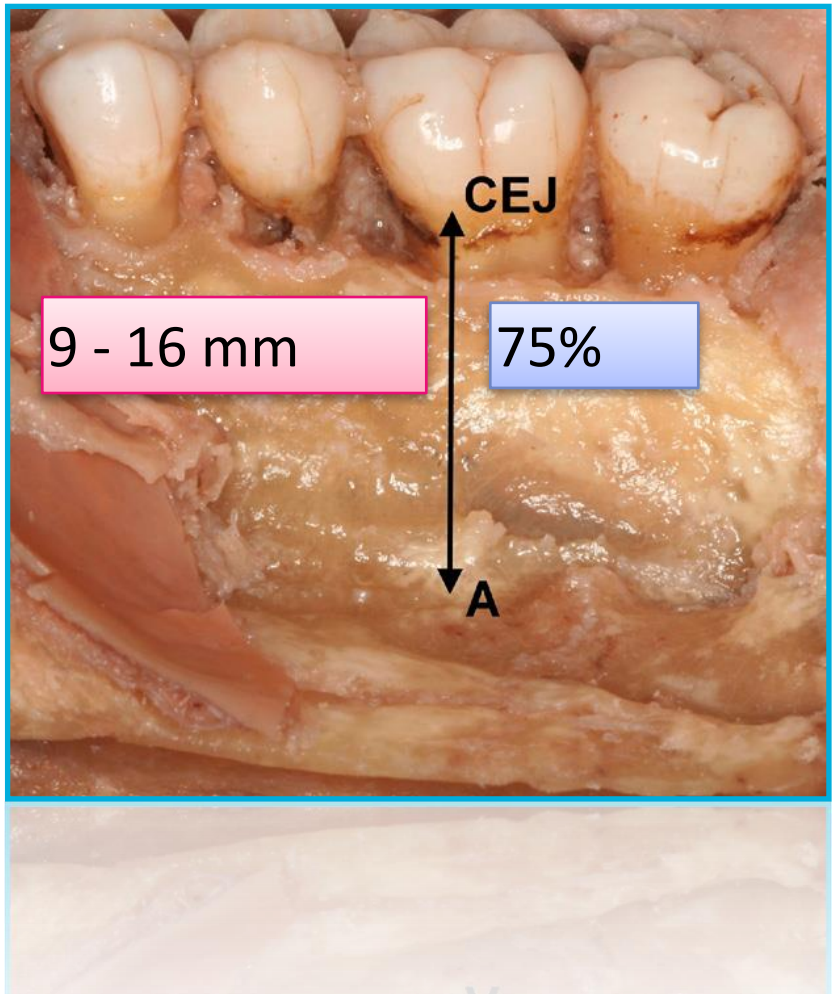
Jia-Hui Fu,* Dawlat G. Hasso,* Chu-Yuan Yeh,* Daylene J.M. Leong,* Hsun-Liang Chan,* and Hom-Lay Wang*

Background: The palate is a common site for harvesting subepithelial connective tissue grafts (SCTG). The size of SCTG that can be harvested is dictated by the position of the greater palatine neurovascular bundle (GPB). The aims of this cadaver study are to assess the accuracy of predicting the location of the GPB on study models and to evaluate anatomic factors that might influence the predictability.

Methods: Eleven fully dentate or partially edentulous maxillary cadavers were used. Study models were fabricated after the greater palatine foramen was identified. The GPB was recognized after dissection, from which the distance to the cemento-enamel junction of the first molar and premolar was measured. Eight periodontists and twelve periodontal residents were asked to estimate the location of the GPB on the study models and the same measurements were taken. Comparisons of the estimated and true GPB position were performed. The correlation between the palatal vault height and the variability of detecting the GPB was investigated.

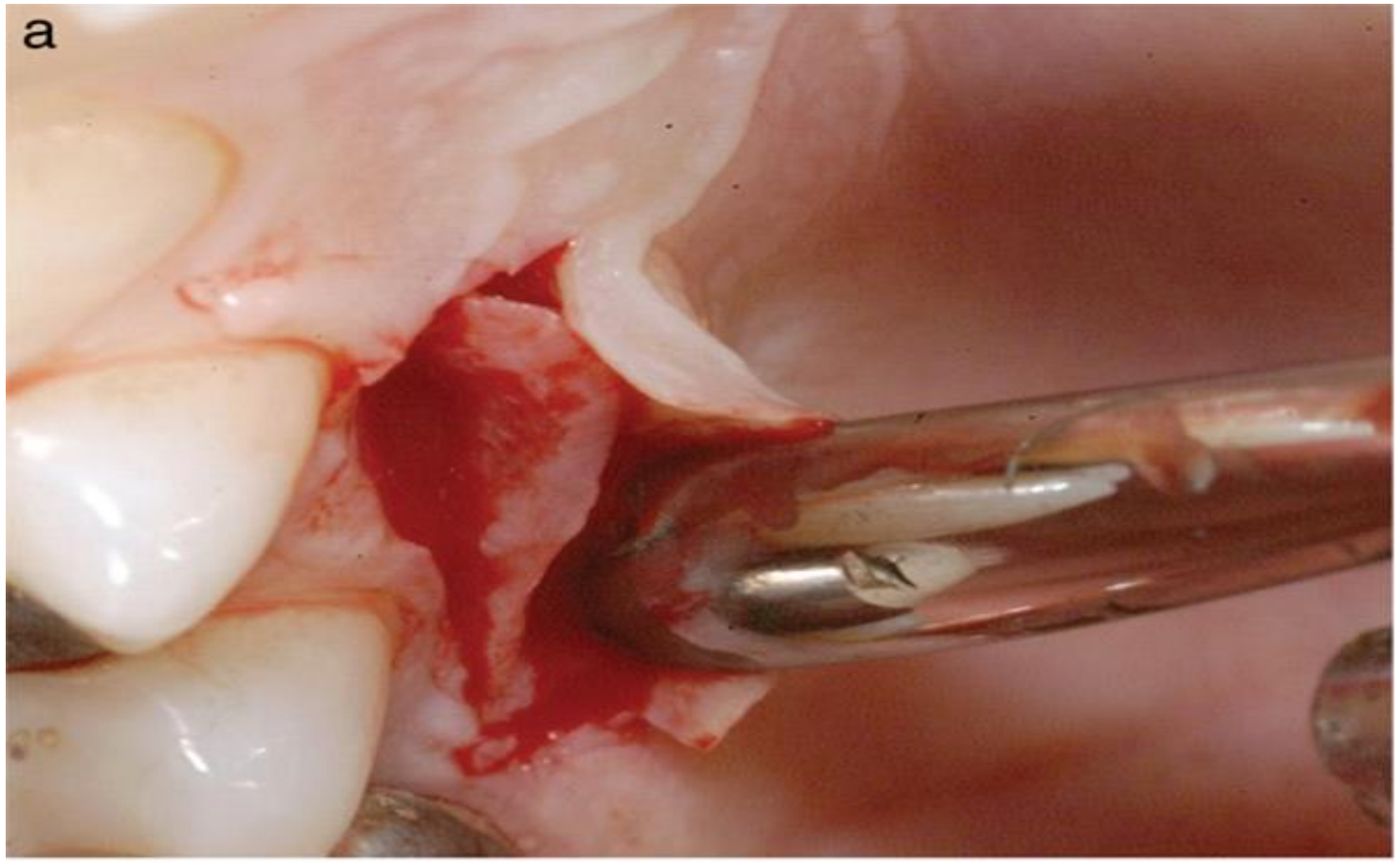
Results: The most frequent greater palatine foramen location was between the second and third molars (66.6%). For

Mucogingival deformity is defined as a departure from the normal dimension and morphology of or interrelationship between gingiva and alveolar mucosa, which may be associated with a defect in the underlying alveolar bone.[1] One common example of a mucogingival deformity is gingival recession, which is the movement of the gingival margin apical to the cemento-enamel junction (CEJ).[1] The prevalence of gingival recession ranges from 0% to 100% depending on the population, age, anatomic factors, physiologic factors, pathologic factors, trauma, and

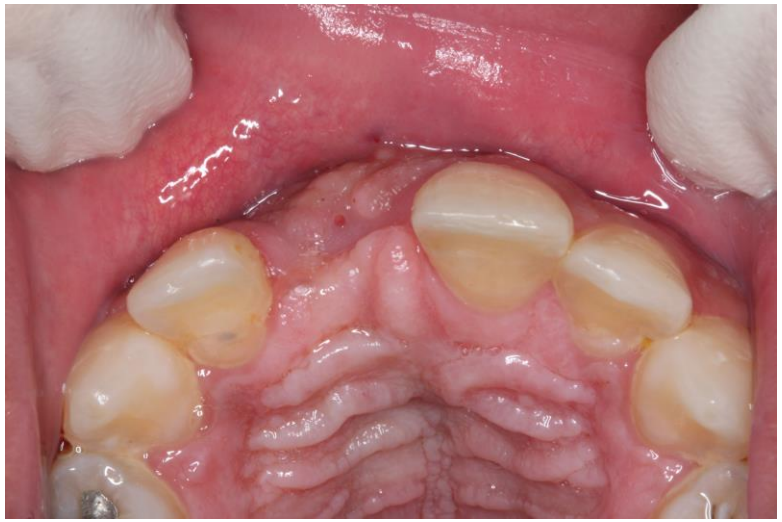


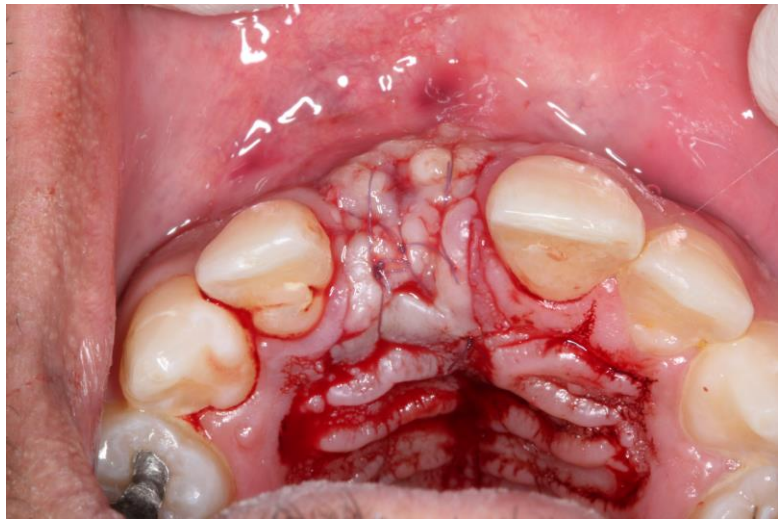
75% of the distance between the CEJ and avoid damage to the GPA and GPN

height, thickness, and length, the useful donor site is located between the distal aspects of the canine to the mid-palatal aspect of the first molar

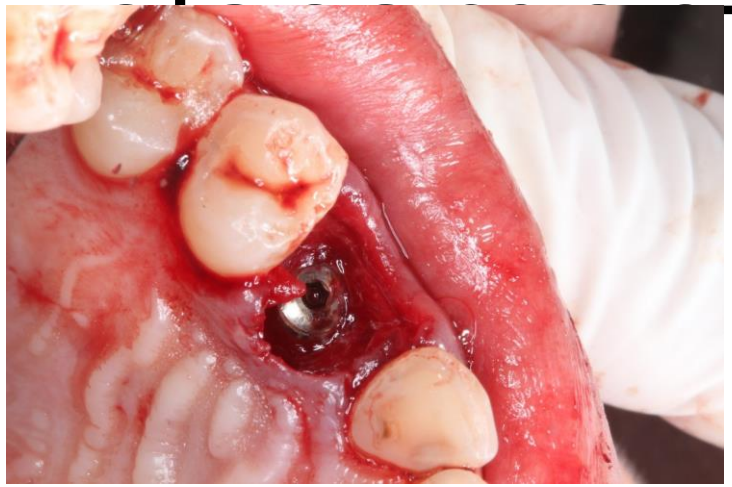


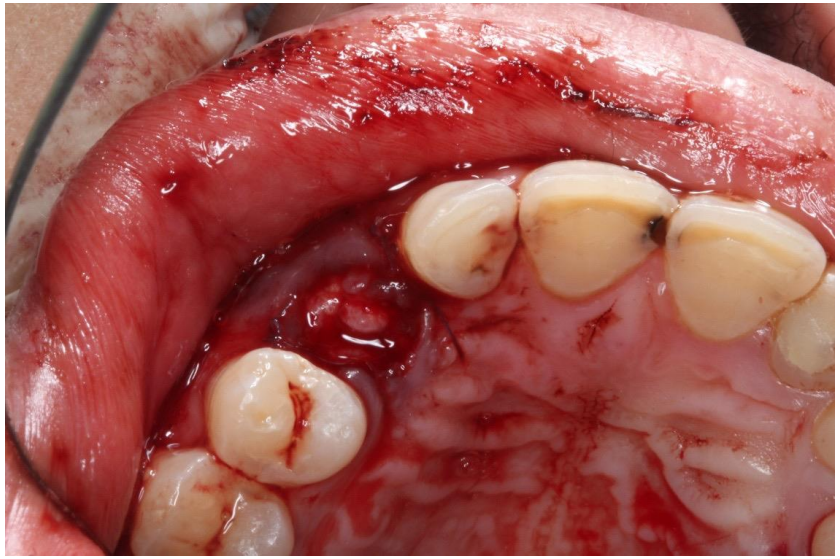
Soft tissue augmentation :Before





Soft tissue at time of implant placement





Soft tissue at the time of Implant Placement

Soft tissue after implantation

CASE REPORT

A Novel Method to Cover Metal Display in Implants Using a Modified Free Gingival Graft: A Case Report

Hani Essam El Nahass*†

Introduction: Correction of an esthetic failure in the anterior esthetic zone is difficult, especially after placement of the final restoration. This case report describes a novel technique to cover metal display with a graft that combines the advantages of the free gingival and the subepithelial connective tissue grafts.

Case Presentation: A patient presented to the author's private practice with marked metal display leading to compromised esthetics. To cover the metal display, it was decided to increase the amount of soft tissue surrounding the implant. A free gingival graft was obtained from the palate with two de-epithelialized extensions to ensure adequate blood supply and excellent color match. The graft was adapted to the recipient site, which included a previously prepared bed and two pouches. The pouches accommodated the de-epithelialized extensions. The clinical outcome exhibited superior results in both volume and quality of the gained soft tissue.

Conclusion: The technique described in this case report could be considered as a method to cover metal display in the esthetic zone to improve the volume and quality of the tissue. *Clin Adv Periodontics* 2015;5:178-183.

Key Words: Alveolar ridge augmentation; dental implants; esthetics, dental; gingiva, surgery; gingiva, transplantation.

Background

The long-term success of an implant has ceased to rely solely on successful osseointegration. It depends to a great extent on stable peri-implant soft tissue, which should be in harmony with the surrounding natural dentition.[1,2] Lack of peri-implant soft tissue would compromise the esthetic outcome of implants placed in the esthetic zone. Various surgical techniques have been proposed to overcome the problem that could affect proper gingival architecture and thus detract from the anterior esthetics.[3-11] Proper manipulation of oral tissues is a prerequisite for successful surgical results.[9,12]

One of the challenges faced while attempting to augment peri-implant soft tissue is the reduced and diversely arranged supracrestal vascular tissue around the fixture. Moreover, peri-implant soft tissue shows the characteristics of a scar with a high density of collagen and a low density of cells and vascular structures.[13] Free gingival grafting is considered to be a versatile technique that can be used effectively when tissue is required for reconstruction of a gingival margin.[3]

Clinical Presentation

A 37-year-old female patient presented to the author's private practice (Cairo, Egypt) in 2012 for evaluation and management of an implant placed in the maxillary anterior region that showed marked metal display (Fig. 1). Medical history was taken, and there were no significant findings. The implant replacing the maxil-

* Faculty of Dentistry, Cairo University, Cairo, Egypt.

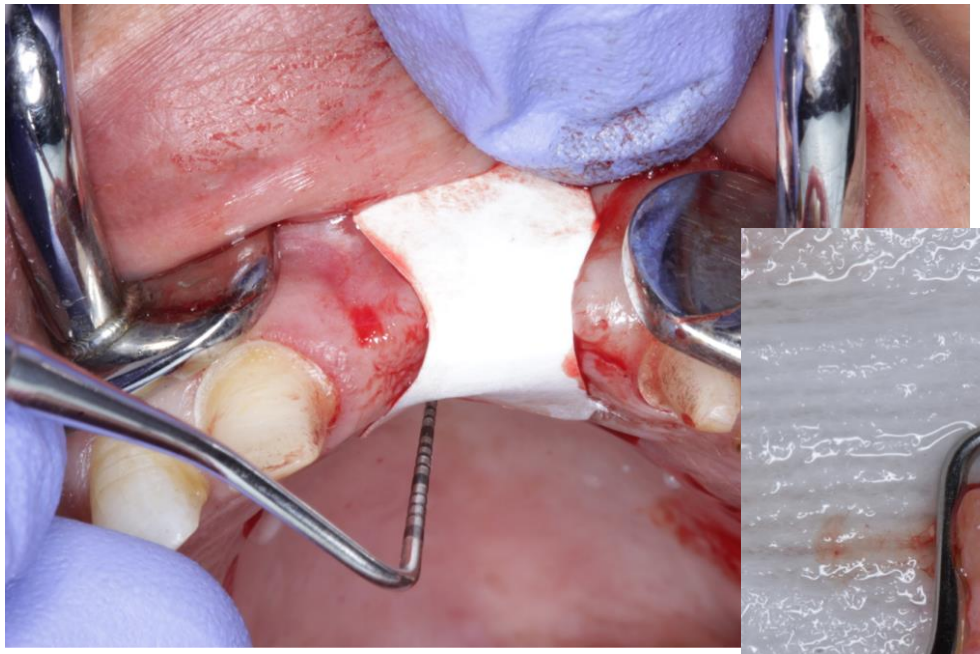
Soft tissue after implantation

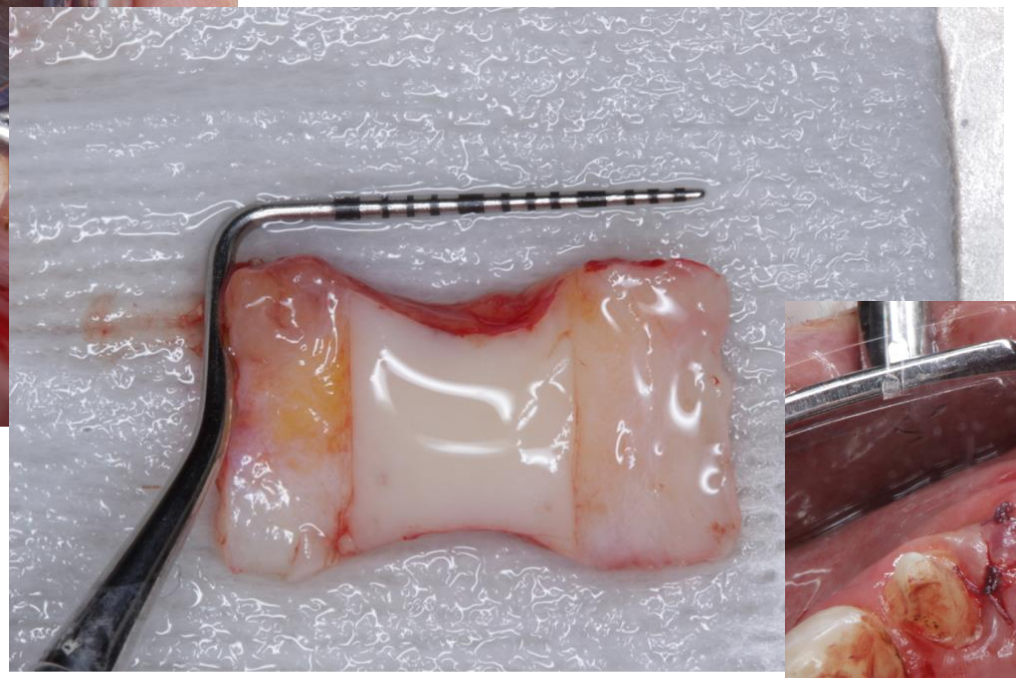
Soft tissue after Implant placement

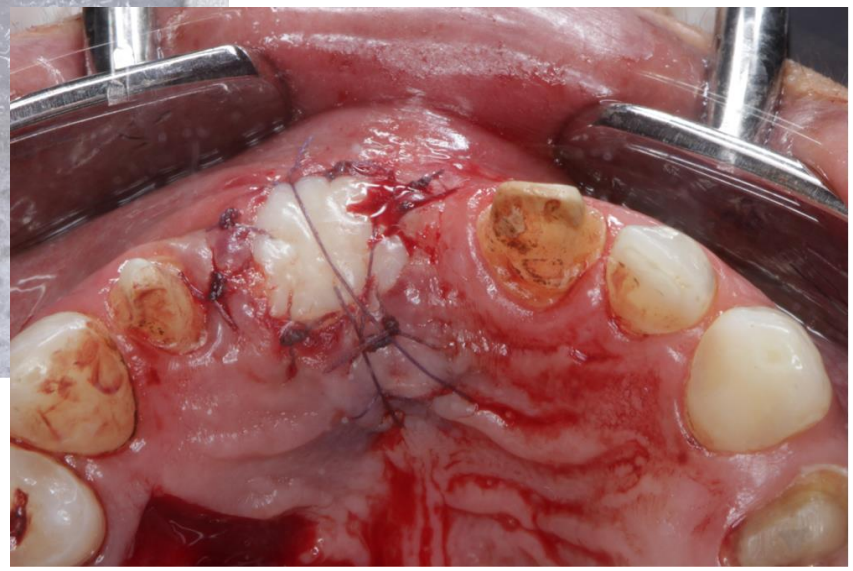
Soft tissue after implantation

Second Case

Second Case







Alternatives

Bio-Col Technique

Anthony G.Solar,1999

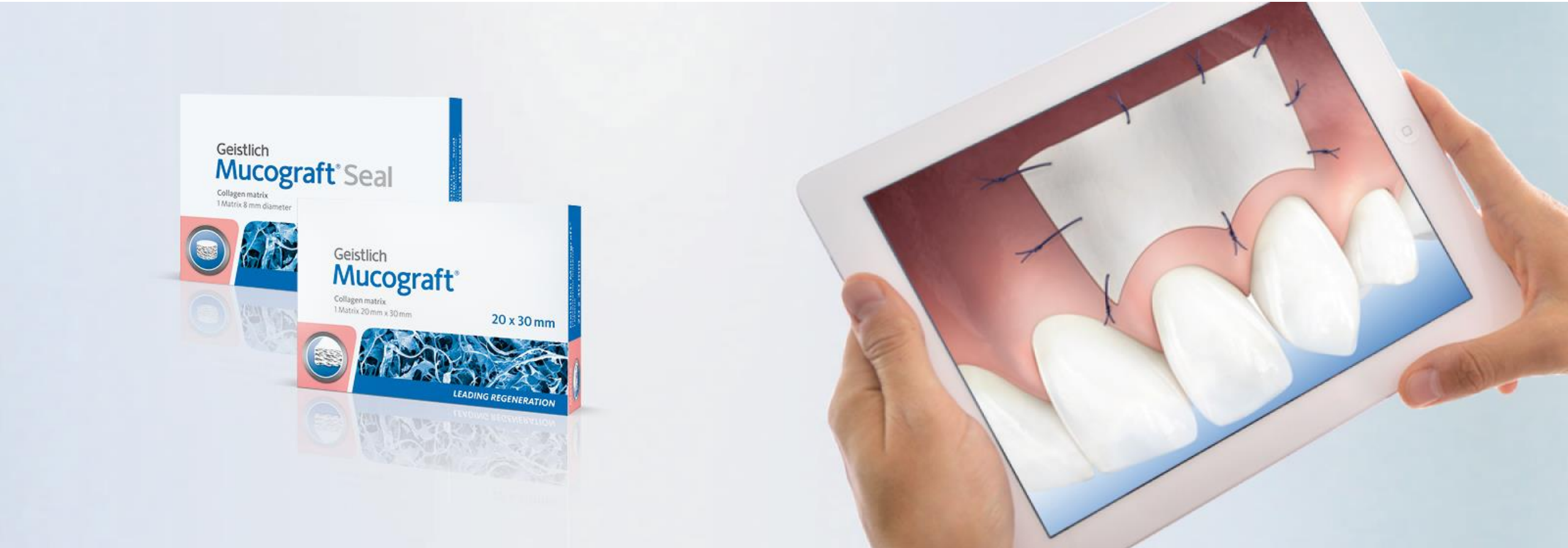
- A technique to ensure preservation of hard and soft tissue at the **time of tooth removal aromatically**

- preparing and grafting a bleeding socket osteoconductive material such as Bio-Oss which and using absorbable collagen dressing such as Collaplug

Allograft (ADM)

Substitute to the SCTG

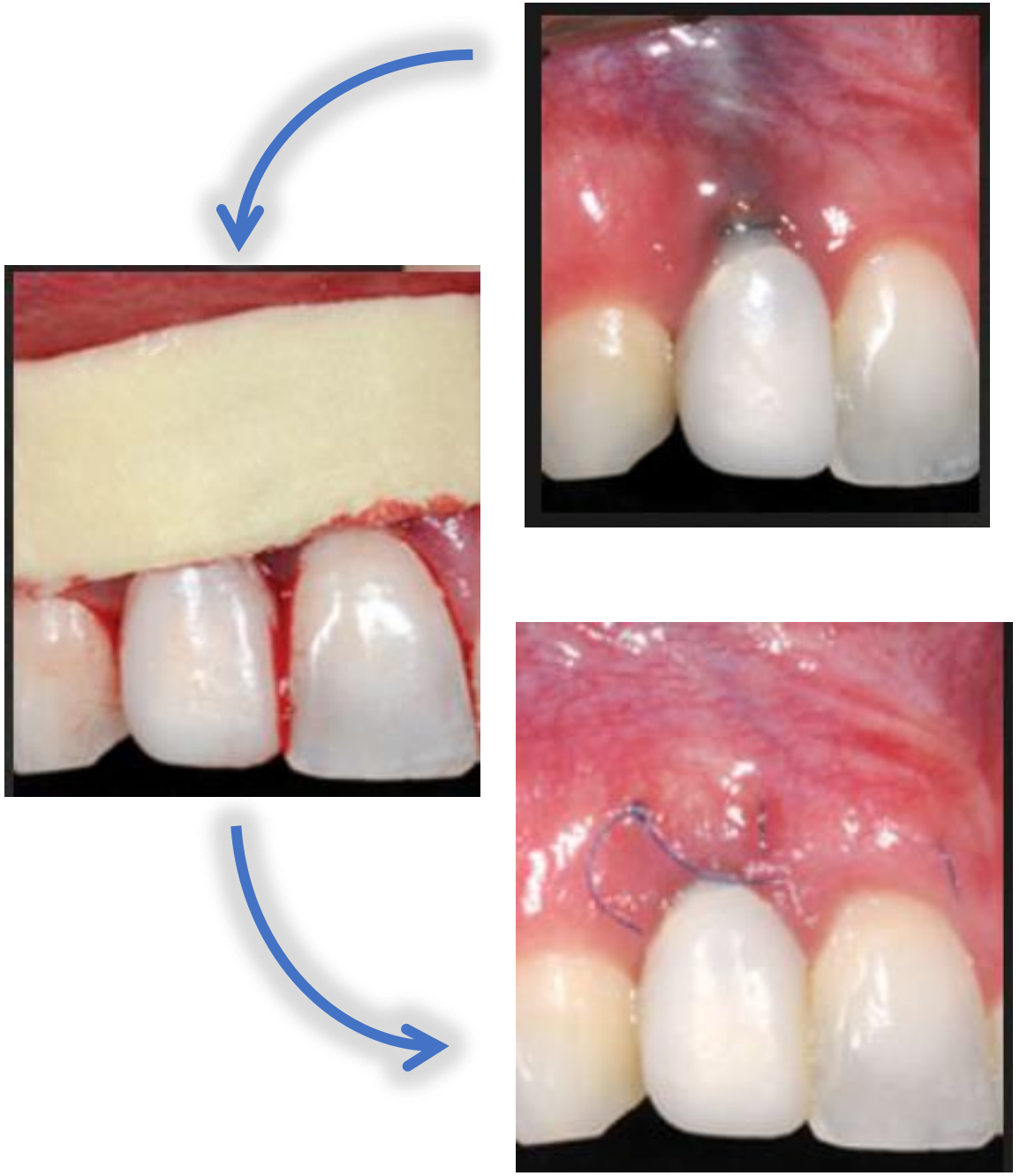
- larger recipient sites
- insufficient autogenous tissue
- less postoperative discomfort.



Allograft (ADM)

Allografts shows similar predictability to SCTG But still SCTG is superior in

- Defect coverage,
- higher keratinized tissue and attachment gain
- lower residual probing depths



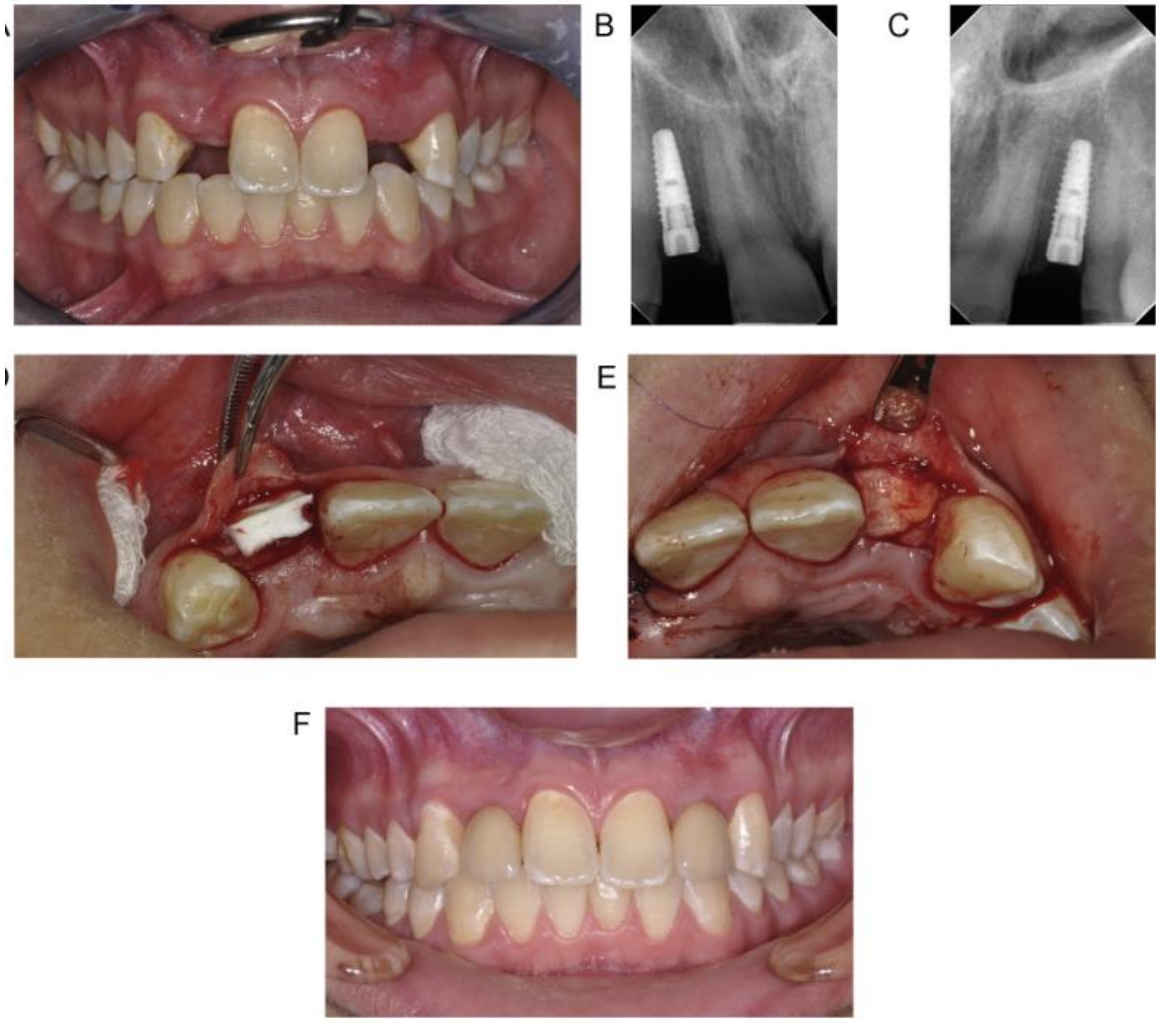
Case Report

A Novel Surgical Procedure for Coronally Repositioning of the Buccal Implant Mucosa Using Acellular Dermal Matrix: A Case Report

Santiago Mareque-Bueno*†

Xenograft

- Xenografts that include thick collagen matrices have been introduced as an alternative to autografts or allografts for use as free gingival or connective tissue grafts



Xenograft

- **In *systematic review*** evaluating esthetic soft tissue management for both teeth and dental implants, xenogeneic collagen matrix **was comparable with SCTG** in terms of mean
  - keratinized tissue gain;
  - not achieve the same soft tissue coverage.

- ***Another systematic review*** of the most effective techniques for soft tissue management around dental implants, the technique using an animal-derived collagen matrix was
  - able to achieve its goal,
  - but at the cost of a worsened esthetic outcome

Table 3
Surgical procedures and timing of soft-tissue augmentation around implants

Procedure	Timing of Augmentation	Outcome and Predictability	Drawback
Free gingival graft	1. Before implant placement 2. At implant exposure 3. Before implant restoration 4. After implant restoration	Highly predictable to increase the soft-tissue volume and keratinization	Unaesthetic outcome due to color and texture that differs from those of the recipient side
Connective tissue graft	At any stage of surgery 1. Before implant placement 2. At implant placement 3. At implant exposure 4. Before implant restoration 5. After implant restoration	Highly predictable with maximum aesthetic results in terms of quantity or quality of tissue support	1. Technically demanding 2. Gingivoplasty may be necessary postoperatively 3. Less keratinization compared with free gingival graft
Apically positioned flap	Mainly at the time of implant exposure	1. Highly predictable 2. Increases the volume of the facial tissues	1. Technically demanding 2. Postoperative pain

When to Augment?

TIMING OF PERI-IMPLANT SOFT-TISSUE AUGMENTATION

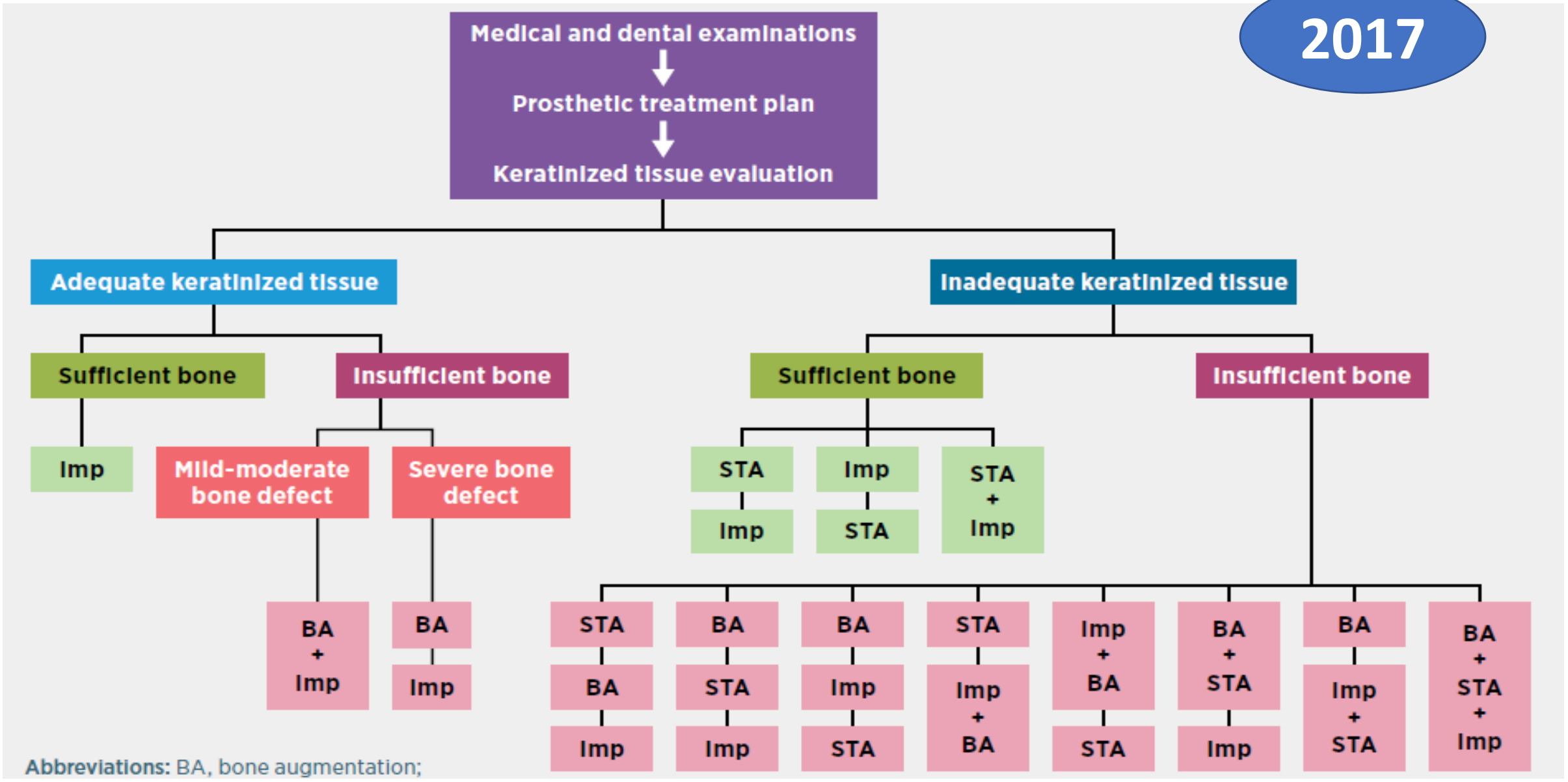
TIMING OF PERI-IMPLANT SOFT-TISSUE AUGMENTATION

Soft-tissue management of dental implant sites may be completed

- before implant placement,
- After implant placement,
- Before prosthetic loading,
- After the prosthetic loading of a dental implant.

Timing of soft tissue management around dental implants: a suggested protocol

Mahdi Kadkhodazadeh, DDS ▪ Reza Amid, DDS ▪ Mehdi Ekhlasmand Kermani, DDS ▪ Mahdieh Mirakhori, DDS
Sepanta Hosseinpour, DDS, MPH

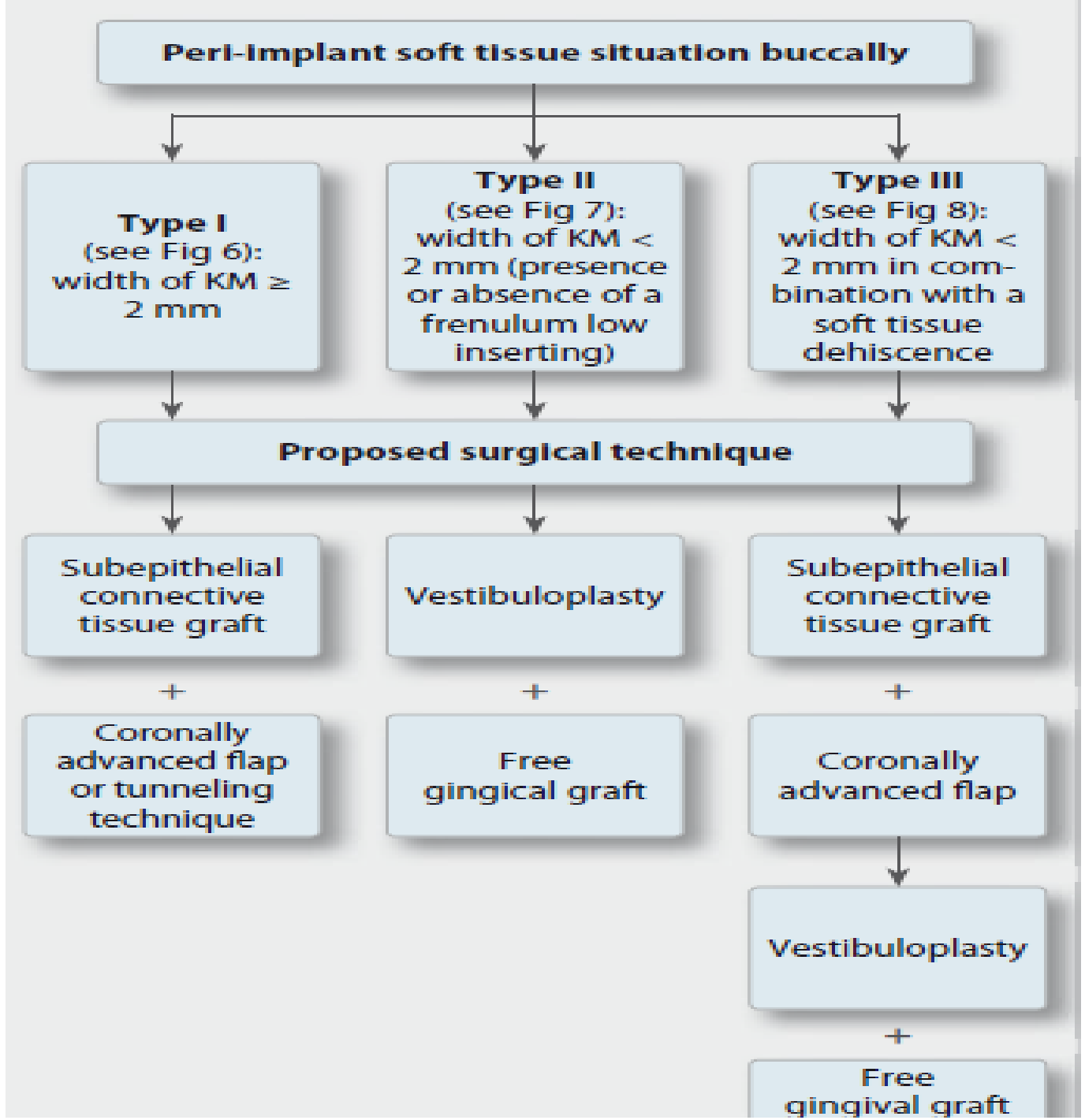


Abbreviations: BA, bone augmentation;

2016

Soft tissue grafting to improve the attached mucosa at dental implants: A review of the literature and proposal of a decision tree

Mario Bassetti, DMD, Dr med dent[1]*/Regula Kaufmann, DMD, MAS, Dr med dent[2]/Giovanni E. Salvi, DMD, Prof Dr med dent[3]/Anton Sculean, DMD, MS, PhD, Prof Dr med dent[4]/Renzo Bassetti, DMD, MAS, Dr med dent[5]*


Peri-Implant soft tissue situation buccally
Type I (see Fig 6): width of KM ≥ 2 mm
Type II (see Fig 7): width of KM < 2 mm (presence or absence of a frenulum low inserting)
Type III (see Fig 8): width of KM < 2 mm in combination with a soft tissue dehiscence
Proposed surgical technique
Subepithelial connective tissue graft
+
Coronally advanced flap or tunneling technique
Vestibuloplasty
+
Free gingical graft
Subepithelial connective tissue graft
+
Coronally advanced flap
Vestibuloplasty
+
Free gingival graft

Does it really differs

- In a study by Stimmelmayr and colleagues on 70 implants, the amount of shrinkage of free gingival graft (FGG) at the time of implant placement **was greater** compared with FGG placed at the second-stage surgery.

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JOURNAL OF Periodontology

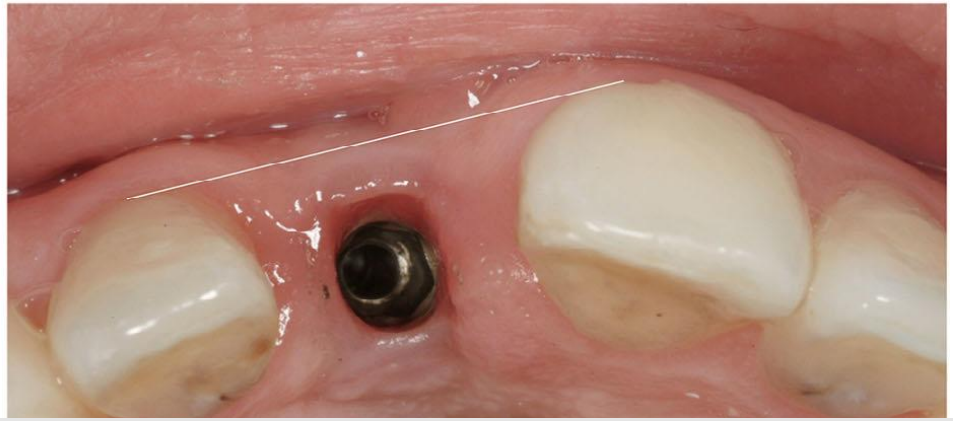
ORIGINAL ARTICLE

Classification of facial peri-implant soft tissue dehiscence/deficiencies at single implant sites in the esthetic zone

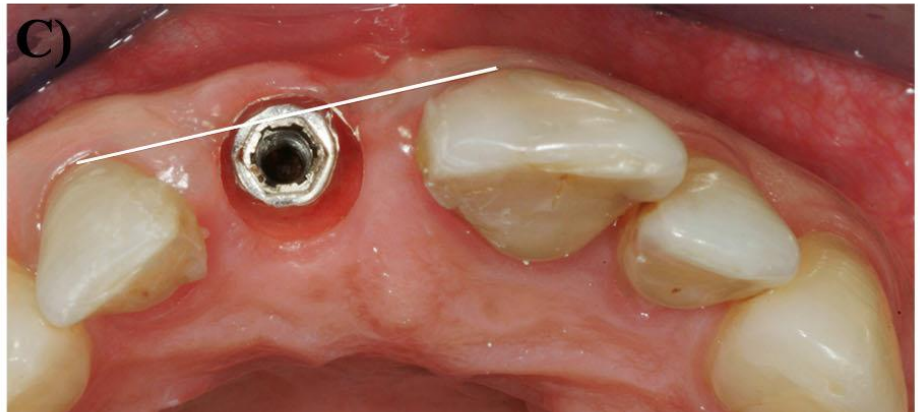
Giovanni Zucchelli[1] | Lorenzo Tavelli[2] | Martina Stefanini[1] | Shayan Barootchi[2] | Claudio Mazzotti[1] | Guido Gori[3] | Hom-Lay Wang[2]

TABLE 1 Classification of peri-implant soft tissue dehiscence/deficiencies (PSTD) and recommended surgical treatment

Class	Peri-implant soft tissue dehiscence/deficiency characteristics	Recommended surgical treatment
I	The soft tissue margin is located at the same level of the ideal position of the gingival margin of the homologous natural tooth, and the color of the abutment/implant is visible only through the mucosa and/or there is a lack of keratinized tissue/soft tissue thickness	Ia: CAF or tunnel + CTG (or other graft substitute Ib: Combined prosthetic-surgical approach
II	The soft tissue margin is located more apical to the ideal position of the gingival margin of the homologous natural tooth, and the implant-supported crown profile is located inside (more palatal) the imaginary curve line that connects the profile of the adjacent teeth at the level of the soft tissue margin	IIa: No crown removal, CAF + CTG IIb: Combined prosthetic-surgical approach IIc: Soft tissue augmentation with submerged healing



III	The soft tissue margin is located more apical to the ideal position of the gingival margin of the homologous natural tooth The implant-supported crown profile is located outside (more facially) the imaginary curve line that connects the profile of the adjacent teeth at the level of the soft tissue margin, and the head of the implant (evaluated by removing the crown) is inside (more palatally) the imaginary straight line connecting the profile of the adjacent teeth at the level of the soft tissue margin	IIIa: Crown removal, CAF + CTG IIIb: Combined prosthetic-surgical approach IIIc: Soft tissue augmentation with submerged healing



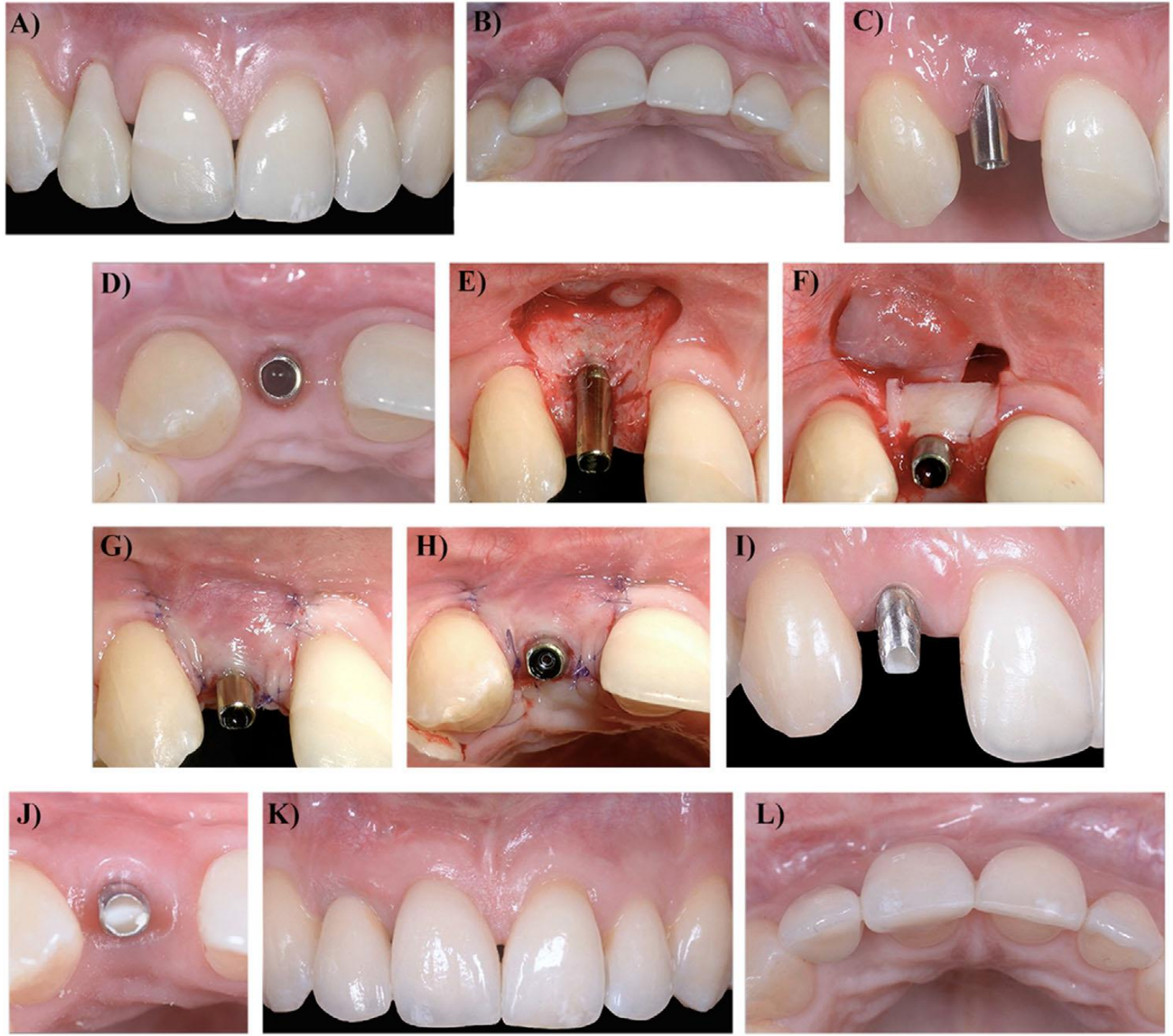
The soft tissue margin is located more apical with respect of the ideal position of the gingival margin of the homologous natural tooth

The implant-supported crown profile is located outside (more facially) the imaginary curve line that connects the profile of the adjacent teeth at the level of the soft tissue margin, and the head of the implant (evaluated by removing the crown) is outside (more facially) the imaginary straight line connecting the profile of the adjacent teeth at the level of the soft tissue margin

IVa: Combined prosthetic-surgical approach

IVb: Soft tissue augmentation with submerged healing

IVc: Implant removal

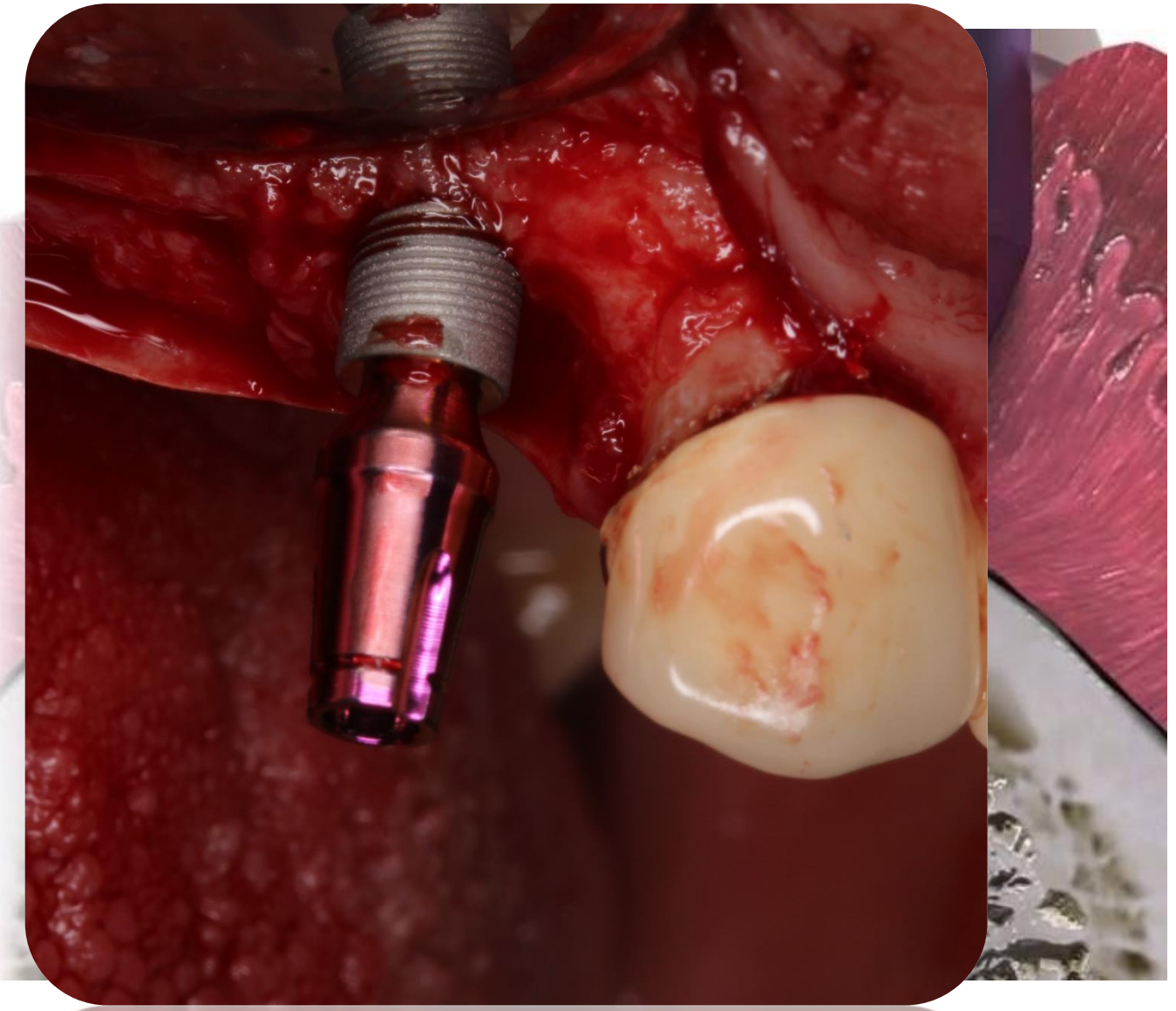

A)
B)
C)
D)
E)
F)
G)
H)
I)
J)
K)
L)

To sum up Esthetic outcome depends on

How to Maintain

- **Implant Design**
  - Smaller Diameter
  - Platform Switching
- **Implant Position**
  - More Palatal
  - More Apical
- **Prosthetic design**
  - Concave abutment Profile
  - Concave Crown Profile
  - Temporiz-ation
- **Surgical Intervention**
  - At implant placement
  - At Exposure
  - Late Stage

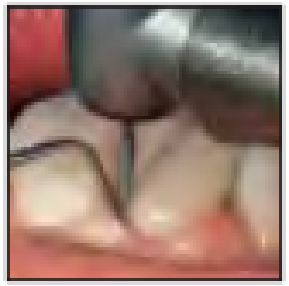
1) Implant design



2) Implant position

3) Prosthetic design

Peri-implant Soft Tissue Conditioning with Provisional Restorations in the Esthetic Zone: The Dynamic Compression Technique



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Simulated tissue using a unique pontic design: A clinical report

Tae Hyung Kim, DDS,[a] Domenico Cascione, CDT, BS,[b] and Alena Knezevic, DDS, PhD[c]

School of Dentistry, University of Southern California,

- Modified ovate pontic fulfills not only the esthetic demands but also hygienic requirements
- Non invasive tissue modeling technique

Implant Exposure Techniques

- In some situations, the cover screw will expose itself completely or partially to the oral cavity
- No need for second surgery

OUR AIM

- Preservation of the continuity of the keratinised tissue band
- Stable soft tissue
- No scar tissue

Implant Exposure Techniques

- Additive
- Subtractive

Subtractive Exposure technique

- Excisional “Destructive” techniques using scalpel, tissue punch or laser
- Subtractive in which kertainised tissue overlying the coverscrew was excised and performed when optimal soft tissue volume was present

Additive Exposure technique

- incisional “Regenerative” techniques that was further subdivided into without tissue transference and with tissue transference.
- Enhance tissue thickness when soft tissue thickness was deficient

Minimally Invasive Procedure

- `

A minimally invasive second-stage procedure for single-tooth implants

Thomas Bernhart, MD, DMA,* Robert Haas, MD, DMA,* George Mailath, MD, DMD,† and George Watzek, MD, DDS‡
Dental School of the University of Vienna, Vienna, Austria

The natural look of dental restorations has become a universally claimed treatment objective, especially when single-tooth gaps are restored with implants. A harmonious gingival margin is crucial to achieve this goal. This article presents a new procedure for exposure of single-tooth implants that yields a favorable esthetic result in the visible maxillary regions because of the simple type of incision used. The procedure consists of two incisions: the first incision makes it possible to find out the implant position and the second incision shapes the mucous membrane according to local supply. The second incision also prevents the soft tissue from tearing after careful stretching and subsequent pressing of the supraimplant mucosa. There is minimal soft tissue traumatization, and as a result, healing time can be reduced to 1 week and an appealing esthetic result can be reached. (J Prosthet Dent 1998;79:217-19.)

Restorations of single-tooth gaps with osseointegrated implants are a valid treatment modality used in an increasing number of patients.[1,2] As patients increasingly demand esthetics, the preservation of the peri-implant soft tissue is becoming more important, aside from the correct positioning of the implant and the availability of sufficient local bone, to achieve as natural a result as possible.[3-6] Soft tissue esthetics[7,8] are a critical factor in the visible maxillary anterior and premolar regions, depending on the smile line.[9] Therefore soft tissue handling is of crucial importance at both implant placement and exposure when two-stage implant systems are used.[10] In principle, two methods to expose implants have been described.[11]

In the excision technique, the supraimplant soft tissue is completely removed. This is performed with a scalpel blade, a punch, or an electrotome.[8,11,12] A disadvantage of this technique, especially for the esthetic outcome, is that attached gingiva is removed and can be completely lost when the initial conditions are less than 4 mm.[11]

The incision technique, also known as reconstructive technique, is based on the creation of a buccally pedicled trapezoid flap. The soft tissue is mobilized, displaced, and sutured in place.[4,10,13] The two vertical relief incisions are not made to avoid recessions at the adjacent teeth.[8] Another modification of this procedure used when the interdental papillae are missing is the attempt to achieve soft tissue regeneration[14,15] at implant exposure. After mobilization of the trapezoid flap, two additional incisions are made to create rotation flaps and these flaps are positioned in the interimplant area.

A modified surgical procedure established by Abrams[16] has been described for single-tooth implants with a collapsed alveolar ridge or a lack in connective tissue.[4,6] This procedure allows soft tissue augmentation with the help of a buccally pedicled, palatally mobilized connective-tissue split-thickness flap that is shoved under the buccal mucoperiosteal flap.[16]

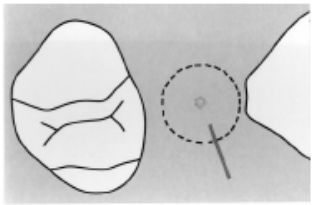


Fig. 1. Schematic drawing of first incision carried out to expose single-tooth implant in region of first premolar tooth.

All of these reconstructive procedures involve more or less extensive soft tissue mobilization and traumatization. They require healing periods of 4 to 10 weeks[8,10] and sometimes additional gingivoplasties to achieve an optimal esthetic result.[4,12]

The purpose of this article was to present a simple minimally invasive procedure for two-stage implant systems with a short healing period and an attainable esthetic result.

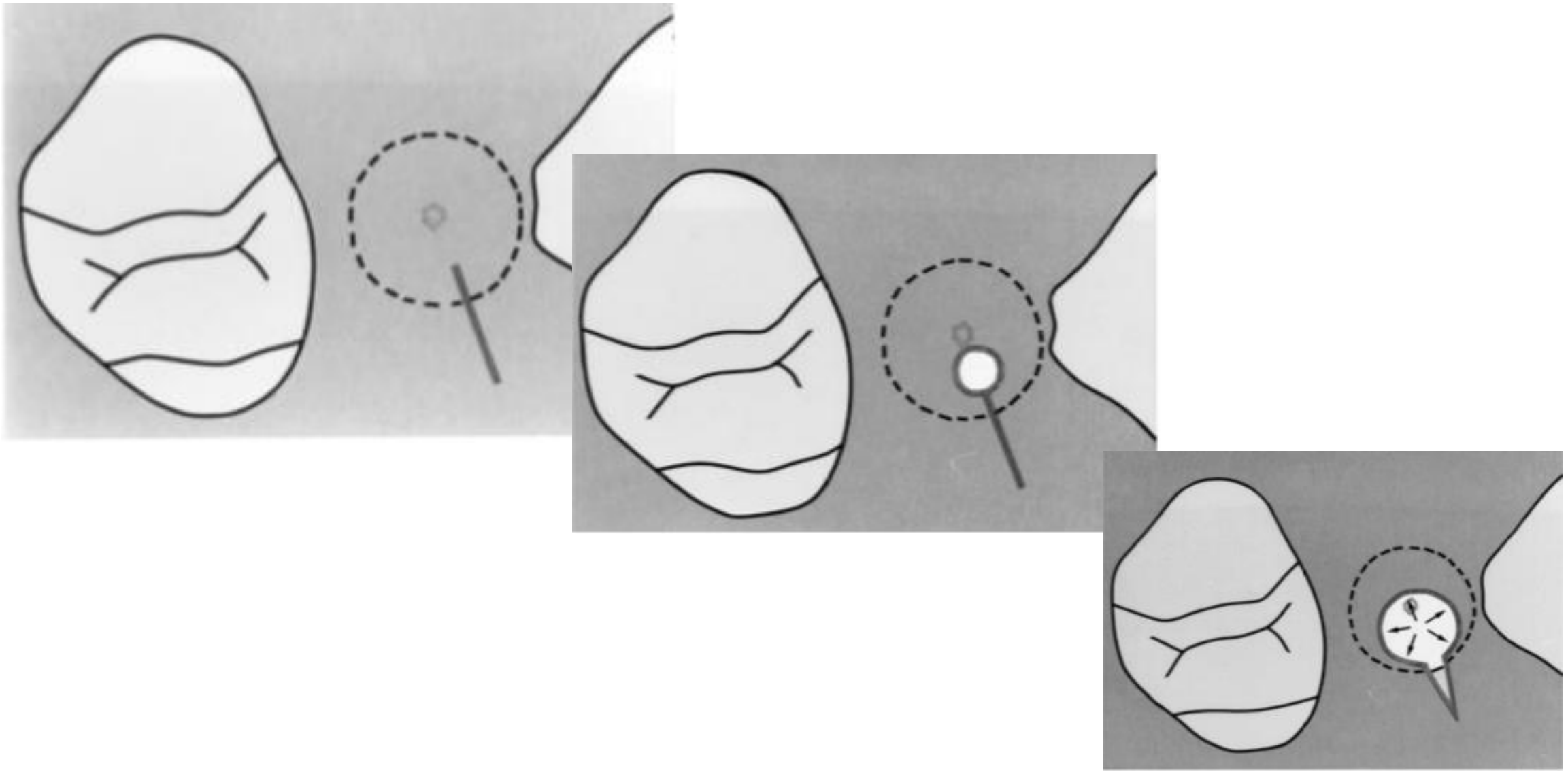
PROCEDURE

The surgical procedure described was conducted under infiltration anesthesia with local anesthetics.

1. Make a vertical incision with a microscalpel blade (Sharpoint, Reading, Pa.) to identify the position

*University Assistant, Department of Oral Surgery.
†Assistant Professor, Department of Oral Surgery.
‡Professor and Head, Department of Oral Surgery.

Excisional



Keyhole Access Technique

Fig 1 (left) *Single-tooth gap with localized ridge defect.*

Fig 2 (right) *Situation after reconstruction of tissues and implant placement. The black dotted line indicates the size of the implant platform, and the white dotted line indicates the size of the surgical "keyhole" access.*

Fig 3 (left) *Minimally invasive stage-two surgery is performed using tissue expansion.*

Fig 4 (right) *The healing abutment is placed, resulting in ischemia at the site.*

Fig 5 (left) *Site at 1 week after stage-two surgery.*

Fig 6 (right) *A customized healing abutment is placed to apply further pressure, again resulting in ischemia.*

Keyhole Access Technique

Fig 7 (left) *Site 1 week after placement of the customized healing abutment.*

Fig 8 (right) *Soft tissue conditions at the time of definitive restoration.*

Fig 9 (left) *Customized zirconia abutment.*

Fig 10 (right) *Periapical radiograph of the customized zirconia abutment and implant.*

Fig 11 (left) *Definitive restoration (cemented all-ceramic single crown).*

- The amount of attached gingiva, the thickness or the biotype of overlying mucosa and presence or absence of the interdental papilla

Incisional Technique

- “+” and “X” incision technique when adequate attached gingiva is present.
- A small crestal incision that will later give place to a cross type [+] incision.
- Diagonal incisions are used [X] when the location of implant is exactly known.

INCISIONAL TECHNIQUE WITH TISSUE TRANSFERENCE

- Entails the grafting of soft tissue with the exposure of the implants

Optimising esthetics in second stage dental implant surgery: Periodontist's ingenuity

A Suchetha, Prajakta Vasant Phadke, N Sapna, HR Rajeshwari

Table 1: Simple equation was developed by Hertel RC[2]

Based on the amount of fixed mucosa	
When fixed mucosa >4 mm	When fixed mucosa 1 mm to 4 mm
Excisional technique	Incisional technique
When too little mucosa is present then	
Free gingival graft preceding the incisional technique	

Incisional techniques: Without tissue transfer

[+] or [X] Incision technique

Incisional technique: With tissue transfer

Depending upon most of the clinical scenarios the techniques are enumerated under the following main purposes

A. For increasing the Keratinised mucosa

Rotated Palatal Strap Technique , Palatal Sliding Strip Flap Technique

B. For increasing the bulk of soft tissue on buccal aspect

Pouch Roll Technique, Rotated Palatal Strap Technique, Palatal Sliding Strip Flap Technique, Split Finger Technique

C. For preservation/regeneration of interdental papilla

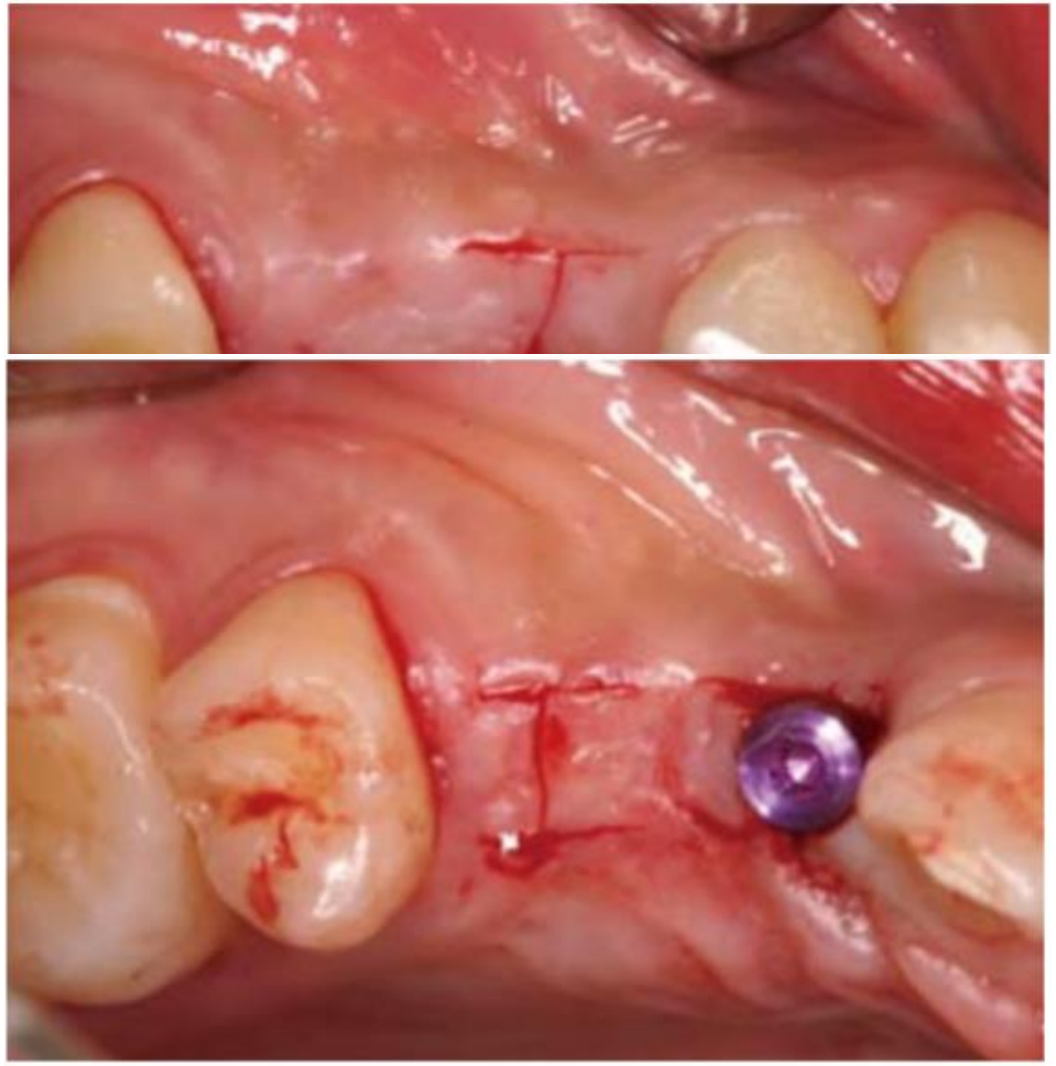
Misch's Split Finger Tehnique , Palacci's Papilla Regeneration Technique, Ramp Mattress Sutures "I" Shaped Incision, "M" Shaped Flap Design, Nemcovsky's Interdental papilla reconstruction

D. In compromised situations

Gingival Soft Tissue Augmentation , Jean-Pierre Arnoux 's Revised technique for stage two procedure for highly resorbed mandible

Papilla regeneration Exposure techniques

- **T-shaped incision** and sliding of both sides of the flap laterally to fill up spaces between the abutment or the gingival former and the adjacent teeth.
- **I-type incision** Labial horizontal incision: 0.5-1 mm inside from the border of implant. Vertical incision: middle line. Palatal horizontal incision: border of implant.



Rotated Palatal Flap Technique and Clinical

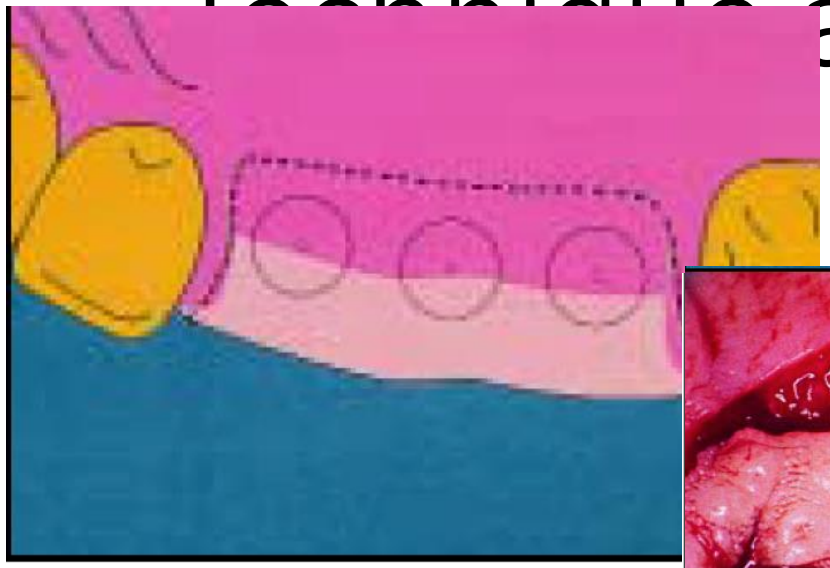


Fig 3 *Palatal location of crestal inc relative to implants.*

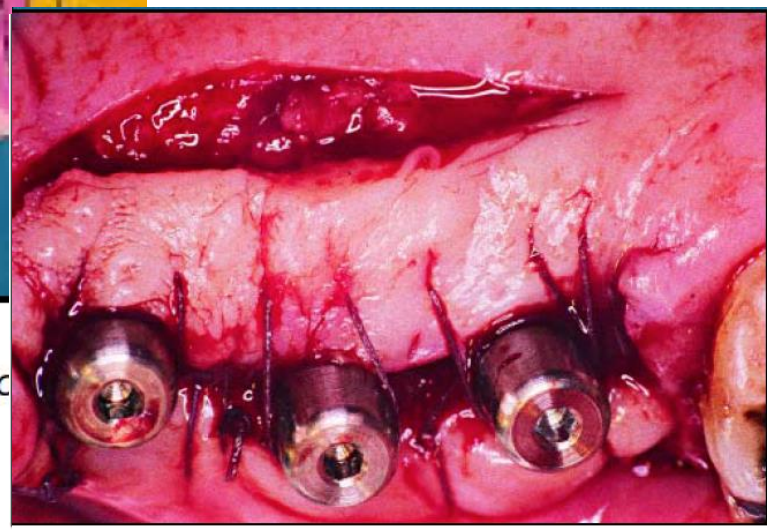


Fig 7 *Full-thickness palatal pediculated flap is raised and rotated to cover exposed implant-supporting bone. Rotated palatal and buccal flaps are repositioned and sutured. Palatal donor area heals by secondary intention.*

Fig 8 *Final su of the procedu*

Fig 9 *After healing, abutments are inserted on implants. There is an adequate width of buccal keratinized gingiva surrounding all abutments (photograph cour-*

Reverse-Split finger

Interproximal Papillae Reconstruction in Maxillary Implants*

Carlos E. Nemcovsky, Ofer Moses, and Zvi Artzi

Background: *Gingival esthetics has become an important factor in the overall success of most maxillary implant-supported restorations. Periodontal plastic surgery procedures may be used to enhance esthetics in the maxillary anterior region. The purpose of the present study was to evaluate a new surgical approach, performed at implant exposure, to reconstruct interdental papillae around maxillary implant-supported restorations.*

Methods: *The surgical procedure was performed on 32 patients, in which 36 consecutive single tooth osseointegrated implants were exposed in the anterior and premolar maxillary region. Previous to implant exposure and 6 months postoperatively, once the implant-supported restoration was in place, mesial and distal papilla contour measurements were calculated, based on a modification of the papillary index score (PIS). Statistical analysis consisted of paired* t *test, Pearson's correlation, and ANOVA with repeated measures.*

Results: *Preoperative PIS ranged from 0 to 3 and from 1 to 3 at the 6 months follow-up control. A mean of mesial and distal papilla, within the same tooth, was used for paired* t *test statistical analysis. A mean increase of 1.07 (SD 0.43) in PIS was statistically significant ($P<0.001$). At the second measurement, in no site was PIS smaller (0%) while in 64 sites PIS was higher (89%). In 51 papilla (71%) there was an increase of 1 PIS unit and 13 (18%) of 2 PIS units between both measurements.*

Conclusions: *The presented surgical technique performed at second stage implant surgery was useful for partial or total interproximal papilla reconstruction adjacent to maxillary single-implant restorations.*
J Periodontol 2000;71:308-314.

KEY WORDS

Dental implants; esthetics, dental; dental papilla/anatomy and histology; dental prostheses, implant-supported.

Root form osseointegrated implants are well documented as predictable long-term replacements for natural dentition.[1-6] Initially, the factors considered while evaluating success included direct contact between alveolar-supporting bone and dental implants, together with lack of clinical and radiographic signs of inflammation.[2]

With the growing use of implant-supported oral rehabilitation in the partially edentulous patient, emphasis has changed towards achieving predictable esthetic success.[7] The common esthetic factor in the anterior maxilla, single tooth implant-supported restorations is the soft-tissue profile, which ideally should be identical to that of the contralateral natural healthy tooth. Soft tissue management has, therefore, become an important topic in implant dentistry and gingival esthetics has become a critical factor in the overall success of an implant-supported restoration.[8-10] Periodontal plastic surgery enables enhanced esthetics in the anterior maxillary region, where minor surgical procedures can improve gingival contours. It is generally accepted that a more ideal and functional soft tissue-implant interface can be established if an adequate zone of keratinized mucosa is present. This will lead to enhanced esthetics, easier restorative manipulation, less gingival recession, easier plaque control, and routine maintenance.[11] Surgical procedures that minimize soft tissue recession, enlarge the zone of keratinized mucosa and recreate the appearance of interdental papilla have been reported.[10,12-19]

Four potential time points can be differentiated for soft and/or hard tissue management: prior to implant placement; at time of placement or during the healing phase of the implant; at second-stage surgery; and in the maintenance phase.[10] The purpose of the present study was to evaluate a novel surgical approach, performed at second-stage, implant-exposure surgery, for creating or reconstructing interdental papillae around maxillary osseointegrated implants.

MATERIALS AND METHODS

The surgical procedure was performed on 32 patients, at second-stage implant exposure surgery, in which

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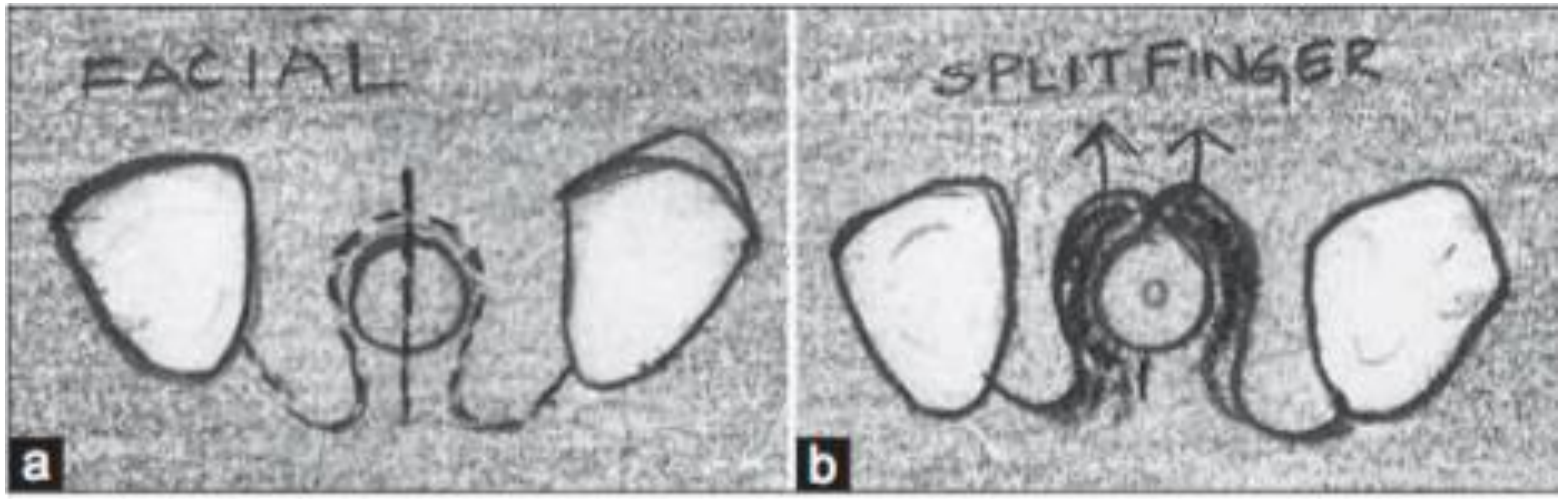
Figure 4.
Occlusal aspects of ridge showing U-shaped incision presenting divergent arms. Papilla remain adhered to proximal teeth. Both sides of the incision are connected, approximately at the palatal aspect of the implant cover screw. Outer edges of the incision and approximal papillae were de-epithelialized.

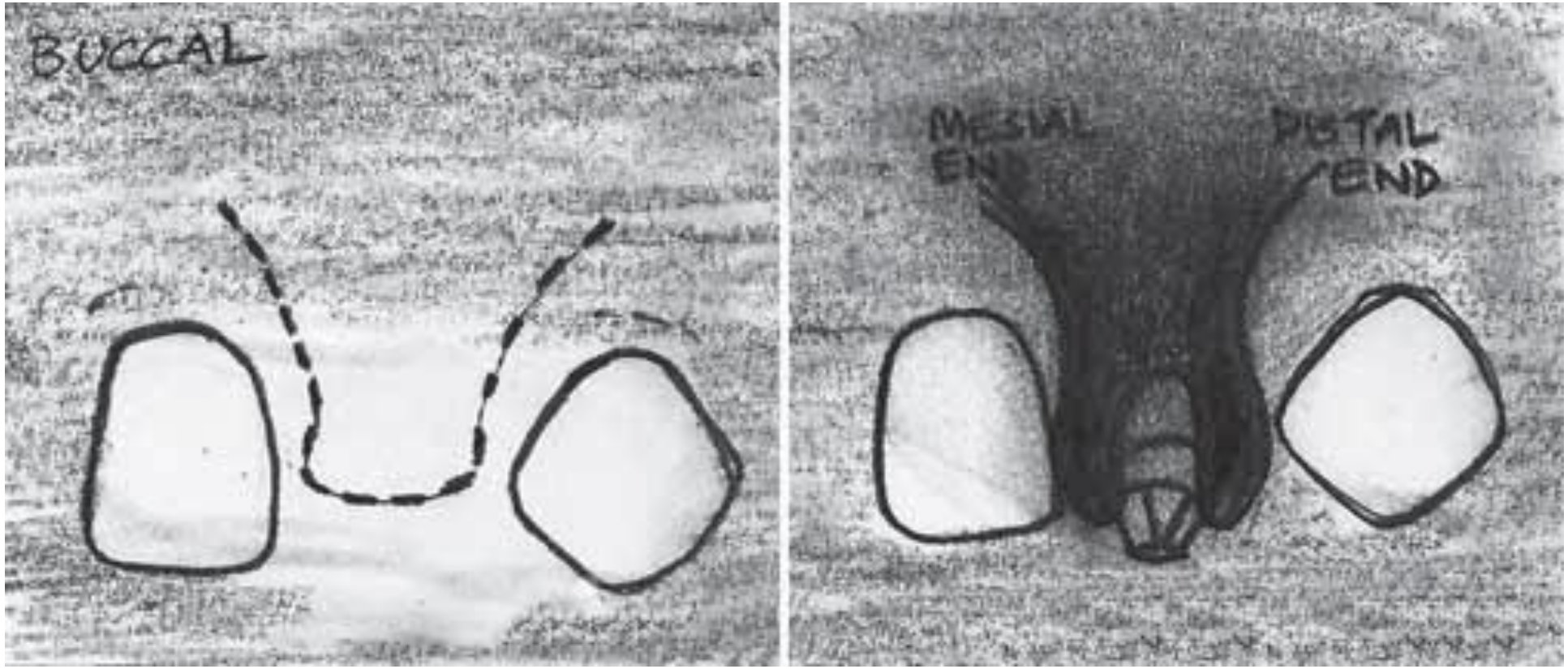
Figure 5.
Buccal aspect of incision described in Figure 4.

Split finger Technique

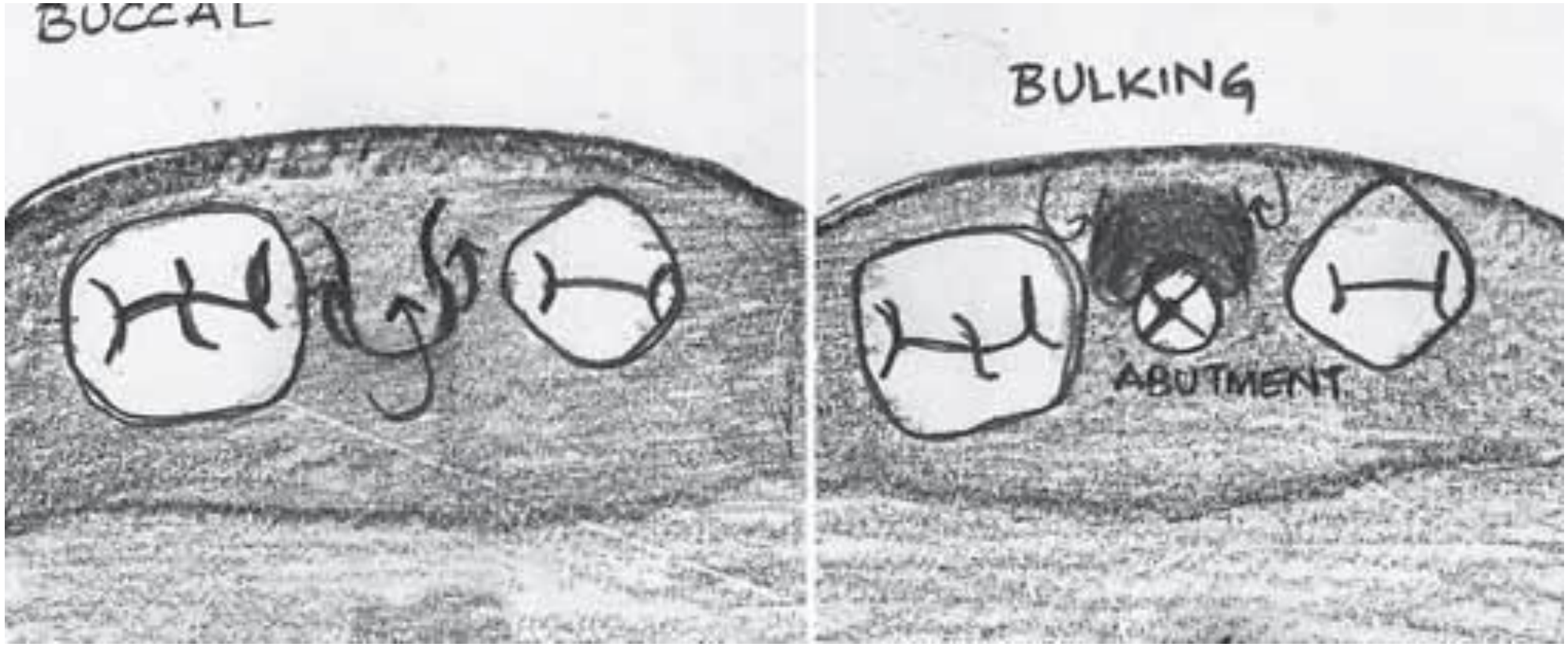


Drawing work shop

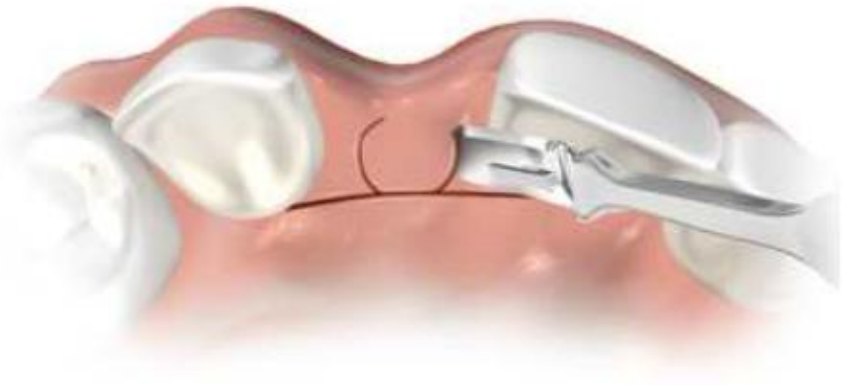
U-shaped incisions



Pouch roll technique



Pouch Roll Technique



Pouch Roll Technique

Pouch Roll Technique

Pouch Roll Technique

Pouch Roll Technique

Case Report

JPIS Journal of Periodontal & Implant Science

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I-shaped incisions for papilla reconstruction in second stage implant surgery

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Purpose: Pink gingival esthetic especially on the anterior teeth has been an important success criterion in implant-supported restoration. Inter-implant papillae are a critical factor for implant esthetics, and various techniques for inter-implant papilla reconstruction have been introduced. The aim of this study is to suggest and evaluate a surgical technique for reconstructing inter-implant papillae.
Methods: A 28-year-old man had an implant placed on the #13 and #14 area. Four months after implant placement, a second stage surgery was planned for inter-implant papilla reconstruction. At the time of the abutment connection, I-type incisions were performed on the #13i & #14i area followed by full-thickness flap elevation and connection of a healing abutment on underlying fixtures without suture.
Results: Two weeks after the second stage implant surgery, soft tissue augmentation between the two implants was achieved.
Conclusions: I-shaped incisions for papilla reconstruction performed during the second stage implant surgery were useful for inter-implant papilla reconstruction and showed a good esthetic result.

Keywords: Dental esthetics, Dental implants, Dental papilla.

INTRODUCTION

Dental implants are now considered a routine treatment modality for replacing missing teeth in the majority of dental applications [1]. However, to reconstruct a natural soft tissue appearance between two implants in the anterior part of the maxilla is complex and challenging [2,3]. Nowadays, pink gingival esthetic has become a hot issue for most clinicians and has been a critical factor in deciding the overall success of the implant-supported restoration [4,5]. The soft tissue profile is one of the most important factors of the esthetic implant-supported restoration; thus clinicians should consider esthetic problems caused by loss of inter-implant papillae in anterior regions. The absence of the inter-implant papilla can lead to cosmetic deformities, phonetic difficulty, and food impaction [6-8]. However, reconstructing a predictable peri-implant papilla is the most complex and challenging aspect of implant dentistry. In particular, when two or more adjacent implants are placed, surgical techniques to reconstruct inter-implant papillae show predictably low results [9], and loss of the vertical dimension of the edentulous ridge may further complicate papilla reconstruction. Although many attempts have been made to reconstruct inter-implant papillae with various surgical techniques, the reconstruction of the papilla adjacent to the dental implant is still difficult to perform and often unpredictable [4,10-12].

Various techniques for reconstructing inter-implant papillae are suggested at the time of second-stage surgery. Palacci

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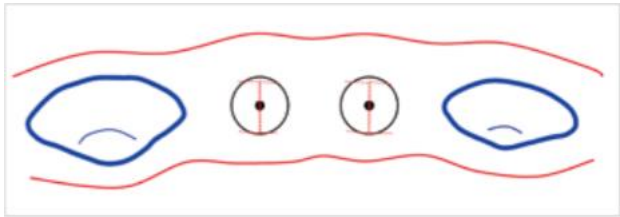


Figs 10a and 10b Single implant model, incision outlines.

Figs 10c and 10d Multiple implant model, incision outlines.

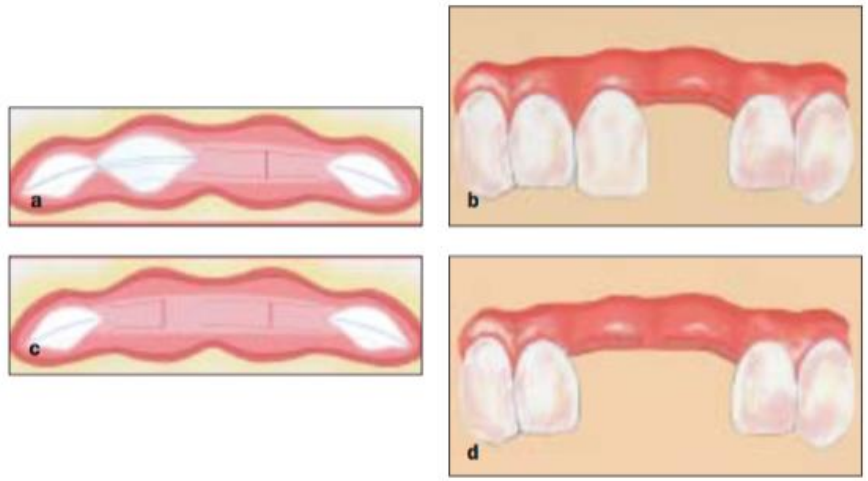
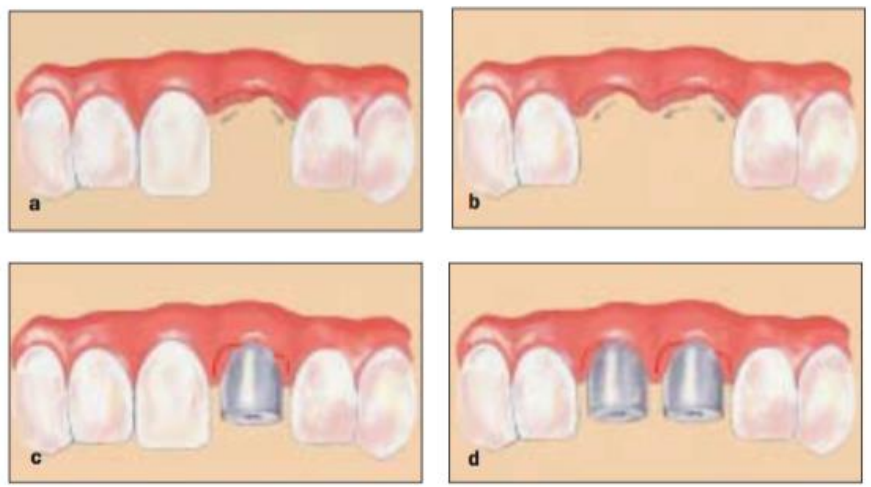


Fig 11a Single implant model, mini-flap elevation.

Fig 11b Multiple implant model, mini-flap elevation.

Fig 11c Single implant model, healing abutment placement.

Fig 11d Multiple implant model, healing abutment placement.



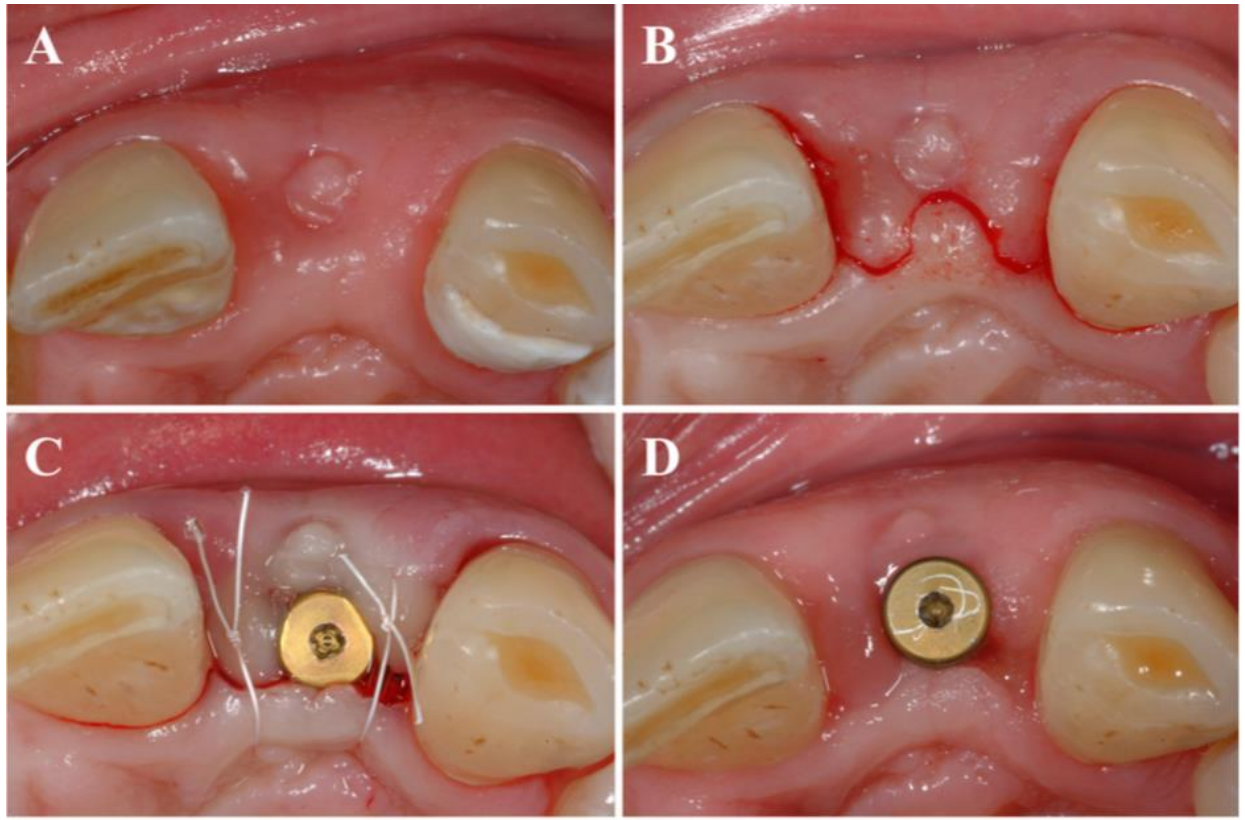
Efficacy of a New Papilla Generation Technique in Implant Dentistry: A Preliminary Study

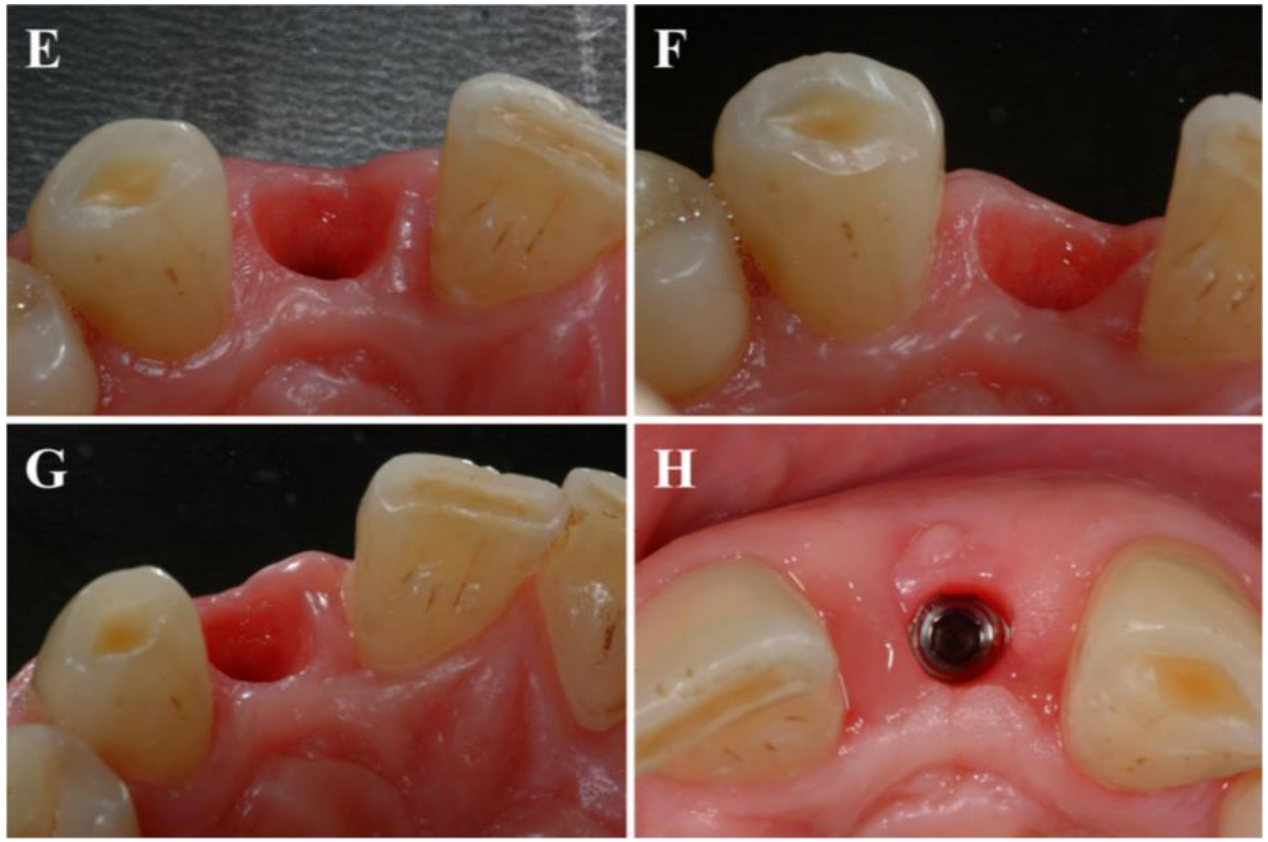
Peyman Shahidi, DDS, MScD[1]/Zhimon Jacobson, DMD, MScD[2]/ Serge Dibart, DMD[3]/Jacob Pourati, DMD, MScD[4]/ Martha E. Nunn, DDS, PhD[5]/Kasumi Barouch, DDS, PhD[6]/ Thomas E. Van Dyke, DDS, PhD[5]

Purpose: *To compare the efficacy of a new uncovering technique with that of the conventional uncovering technique for papilla generation.* ***Materials and Methods:*** *Thirty-three patients with 67 implants were enrolled in the study. Patients were randomly assigned to 1 of 2 treatment groups (test and control). Implants of the test group were uncovered by the new technique and implants of the other group uncovered by the conventional technique (simple midcrestal incision). The height of each papilla after uncovering at baseline, 3 months, and 6 months and the thickness of the tissue covering the implant prior the uncovering were measured. PPD, PI, GI, and BOP measurements were made at 0 and 6 months, and standardized radiographs were obtained at 0, 3, and 6 months. Subject means were used for all statistical analyses.* ***Results:*** *The mean difference between the 2 surgical methods revealed that the new technique provided 1.5 mm greater papilla height (P < .001) at all 3 visits (baseline, 3, and 6 months) for implants adjacent to teeth. An overall significant difference for papilla height between the implants was detected between the 2 groups (P = .02). There was no significant difference between the 2 groups with regard to PPD, PI, GI, BOP, thickness of soft tissue, or overall bone level measurements during the course of the study.* ***Conclusion:*** *Based on this study, it appears that over the course of 6 months, the new surgical approach for uncovering leads to a more favorable soft tissue response.* Int J Oral Maxillofac Implants 2008;23:926–934

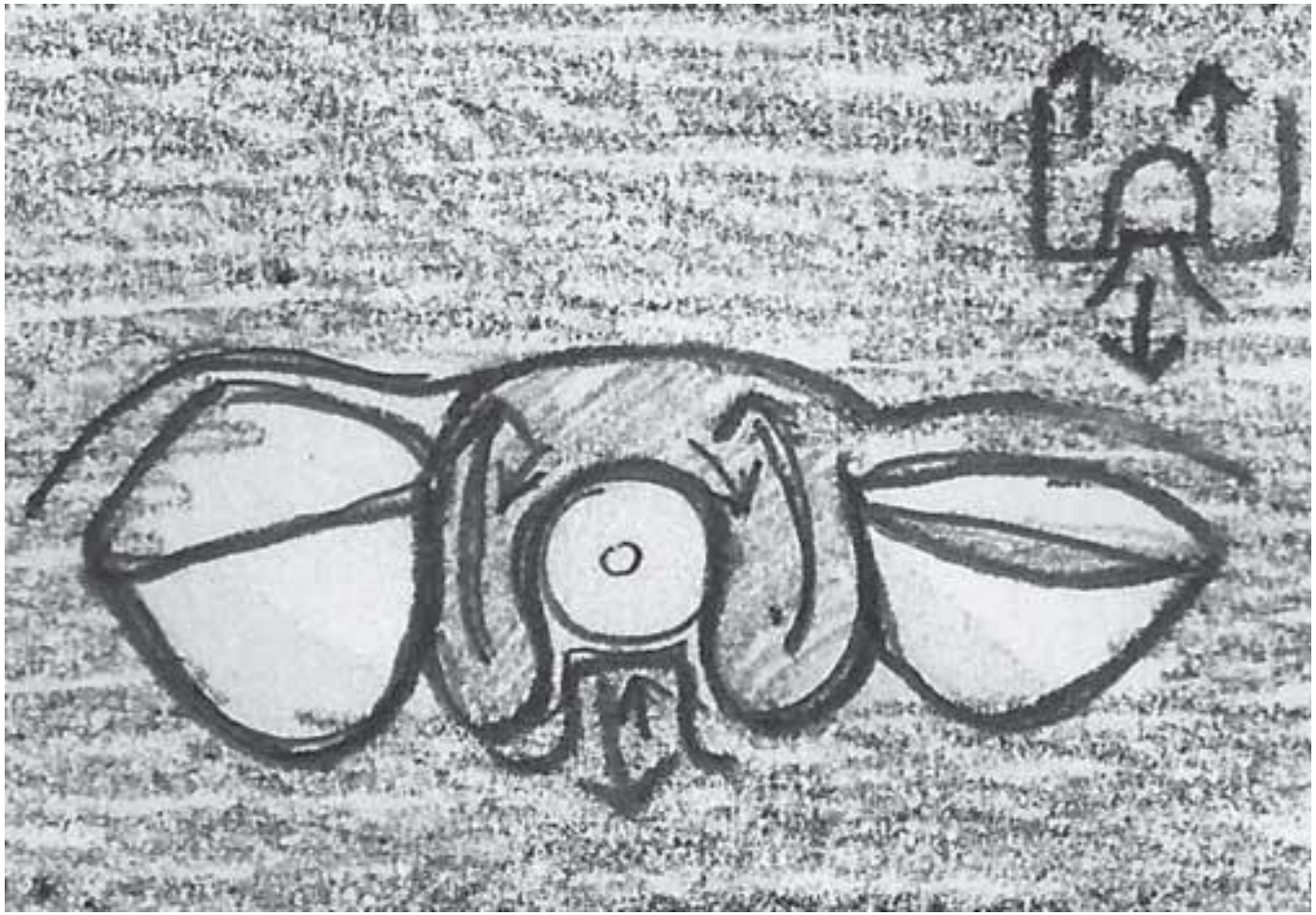
Key words: *implant esthetics, papilla generation*

M - Flap Design

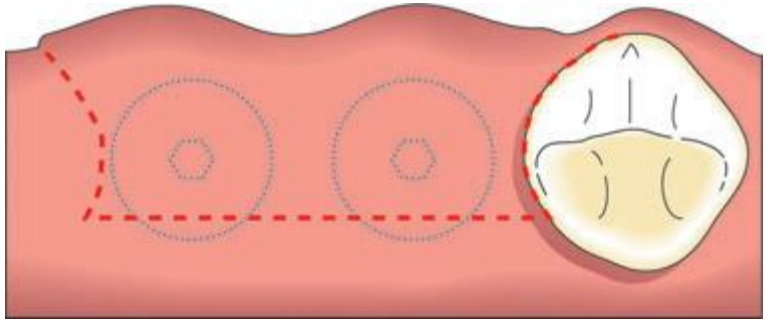




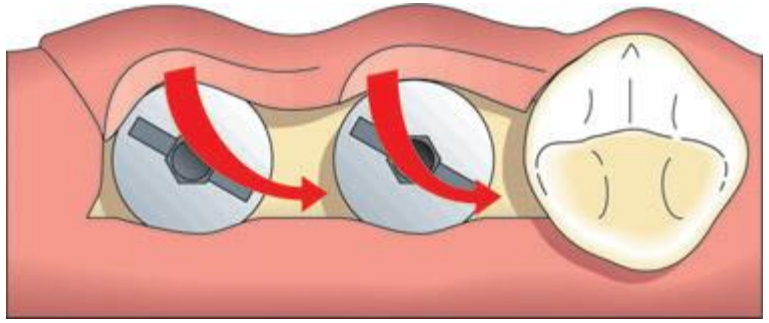
“M” shaped flap design



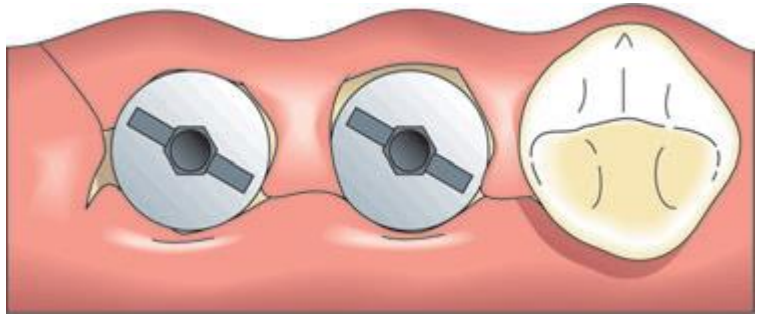
Multiple Implant Exposure Technique / Palacci



Full thickness flap that elevated and reflected labially.

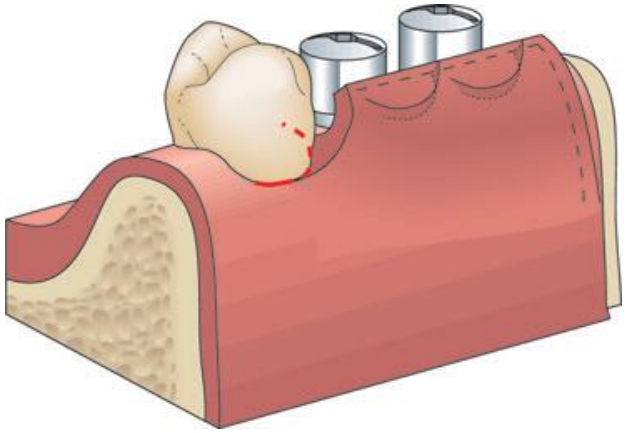


Semilunar bevel incision would be made, recreating a scalloped shape similar to that of tissues around natural teeth.

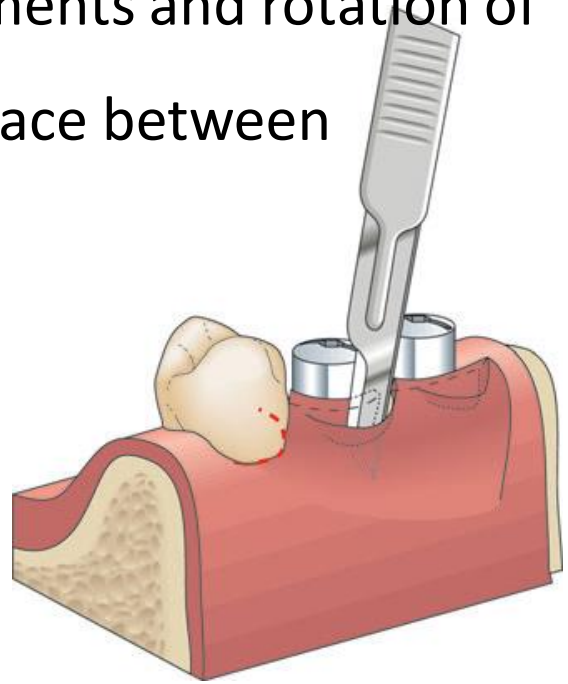


The pedicles would be rotated to fill the inter abutment and abutment-tooth

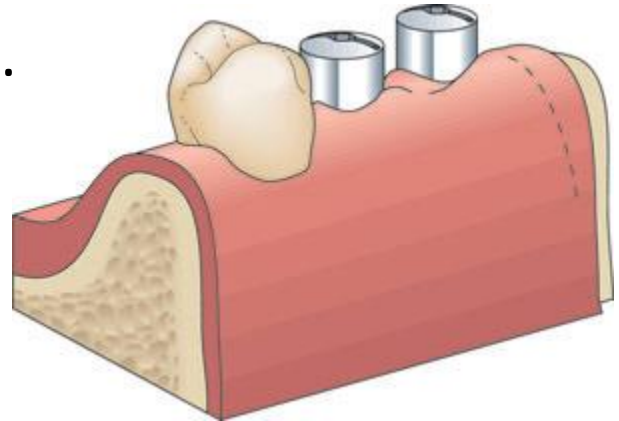
Multiple Implant Exposure Technique / Palacci



Placement of the healing abutments and rotation of the pedicles. Pedicles fill the space between abutments.



The full-thickness flap was elevated and reflected labially. Semilunar bevel incisions were made, recreating a scalloped shape similar to that of tissues around natural teeth.



The pedicles were rotated to fill the inter-abutment and abutment–tooth spaces.

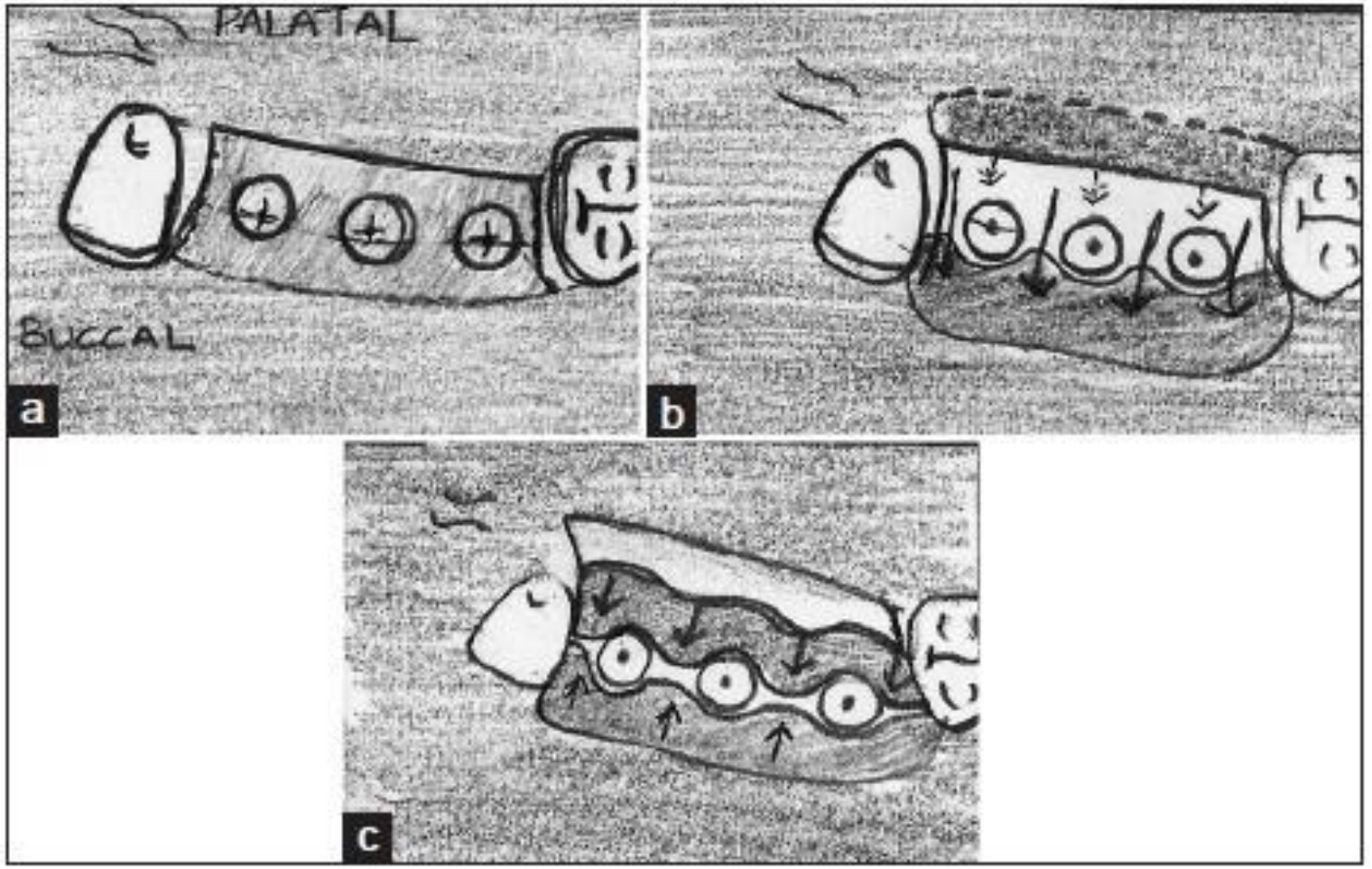
Multiple Implant Exposure Technique / Palacci






Improvement in alveolar ridge morphology, Mattress sutures hold the tissues in place.

Rotated palatal strap



Which technique we can use ???

Papilla Regeneration

- Split finger
- Reverse split finger
- Palacci
- T , I Incisions

Buccal contour regeneration

- Roll Flap
- Modified roll Flap
- Rotated palatal strap

Papilla &Buccal contour regeneration

- U shape incision
- M flap
- Pouch roll


sopix²

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DENTAL CORNER
COSMOTIC, IMPLANT & GENERAL DENTISTY
Dr. Mustafa Gameel

Screw Retained Zirconia Crown on Ti-base


Thank you!

Palatal Sliding Strip Flap

Palatal Sliding Strip Flap: Soft Tissue Management to Restore Maxillary Anterior Esthetics at Stage 2 Surgery: A Clinical Report

Philippe Adriaenssens, LDS*/Marc Hermans, LDS*/Abraham Ingber, DDS**/
Vincent Prestipino, DDS**/Philippe Daelemans, MD, DDS***/
Chantal Malevez, MD, DDS***

A new soft tissue flap design technique, called "the palatal sliding strip flap" (PSSF), has been developed to improve the soft tissue surgical results at stage 2 implant surgery. The purpose of this flap design is to help form papillae between implants and between natural teeth in the anterior area of the maxilla. The flap is designed and managed so that the palatal attached mucosa slides in a labial direction to create papillae and at the same time augment the labial ridge. This surgical approach is valid, predictable, and has a low risk-to-benefit ratio. This new flap design is indicated for a variety of clinical situations, especially for the problematic maxillary soft tissue reconstruction around teeth and implants.
(Int J Oral Maxillofac Implants 1999;14:30–36)

Key words: flap design, palatal strip, papilla regeneration

The ultimate goal of endosseous implant treatment is to provide support for the replacement of a single missing tooth.[1–3] The single-tooth implant restoration has become a viable treatment option in restorative dentistry.[2,4,5] This clinical application of individual implant restorations has become possible with the introduction of premachined modified and customized prosthetic components.[6–8] To gain the best possible esthetic outcome, the single-implant restoration[9–11] required a subgingival modification of an original supragingival implant concept.[12] This modification, along with some critical factors such as optimal implant position, soft and hard tissue reconstruction, and restorative integration, needs to be addressed to improve esthetic results.

In response to changing treatment concepts, different surgical approaches to single-implant placement have been developed, including immediate placement following tooth extraction,[13] guided tissue regeneration techniques,[14] guided soft tissue augmentation,[15] regeneration of soft tissue and bone around implants with and without membranes,[16–23] and/or a combination of all the above techniques. The cosmetic demands from the profession, as well as from patients, for more esthetic implant restorations in the anterior maxilla has resulted in the creation of a variety of innovative implant components.[24] Particularly for the single-tooth implant restoration, prosthetic components have evolved from a supragingival to a subgingival abutment and from a titanium abutment to an all-ceramic abutment concept.[25–28] The implant restoration must regenerate the relationship between teeth, soft tissue, and lips. To obtain the correct soft tissue profile, site preparation must be improved through soft tissue management.[17] Periodontal plastic procedures have been introduced in implant dentistry. As they are technique sensitive,[29] they could potentially jeopardize long-term final results and may have a high risk-to-benefit

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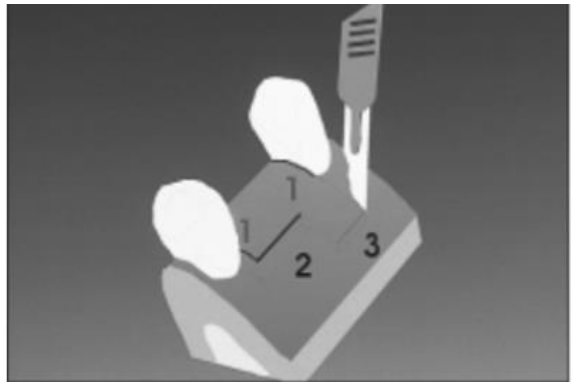
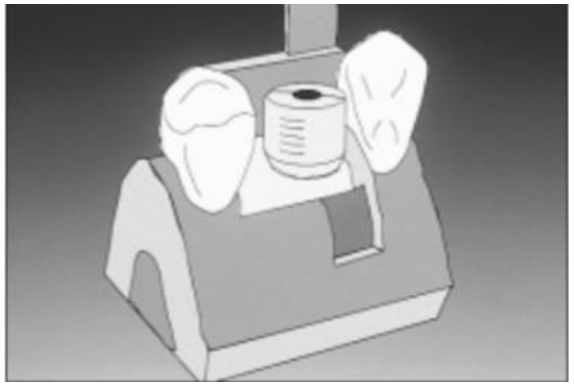
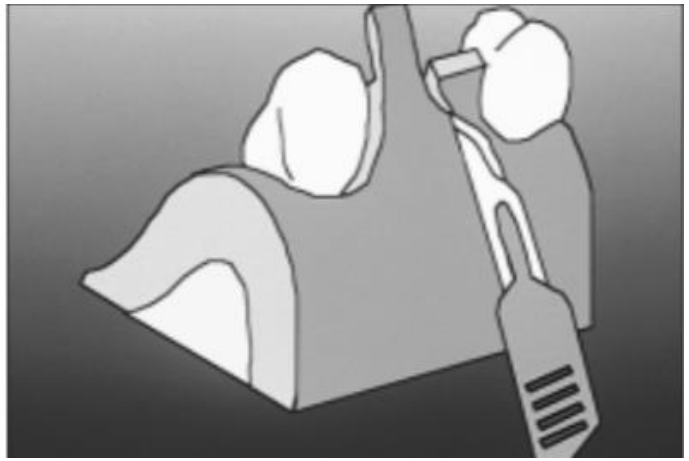
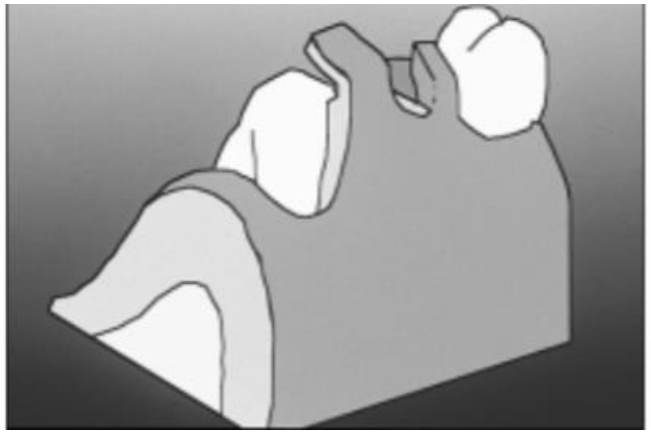






Palatal Sliding Strip Flap



Palatal sliding strip flap